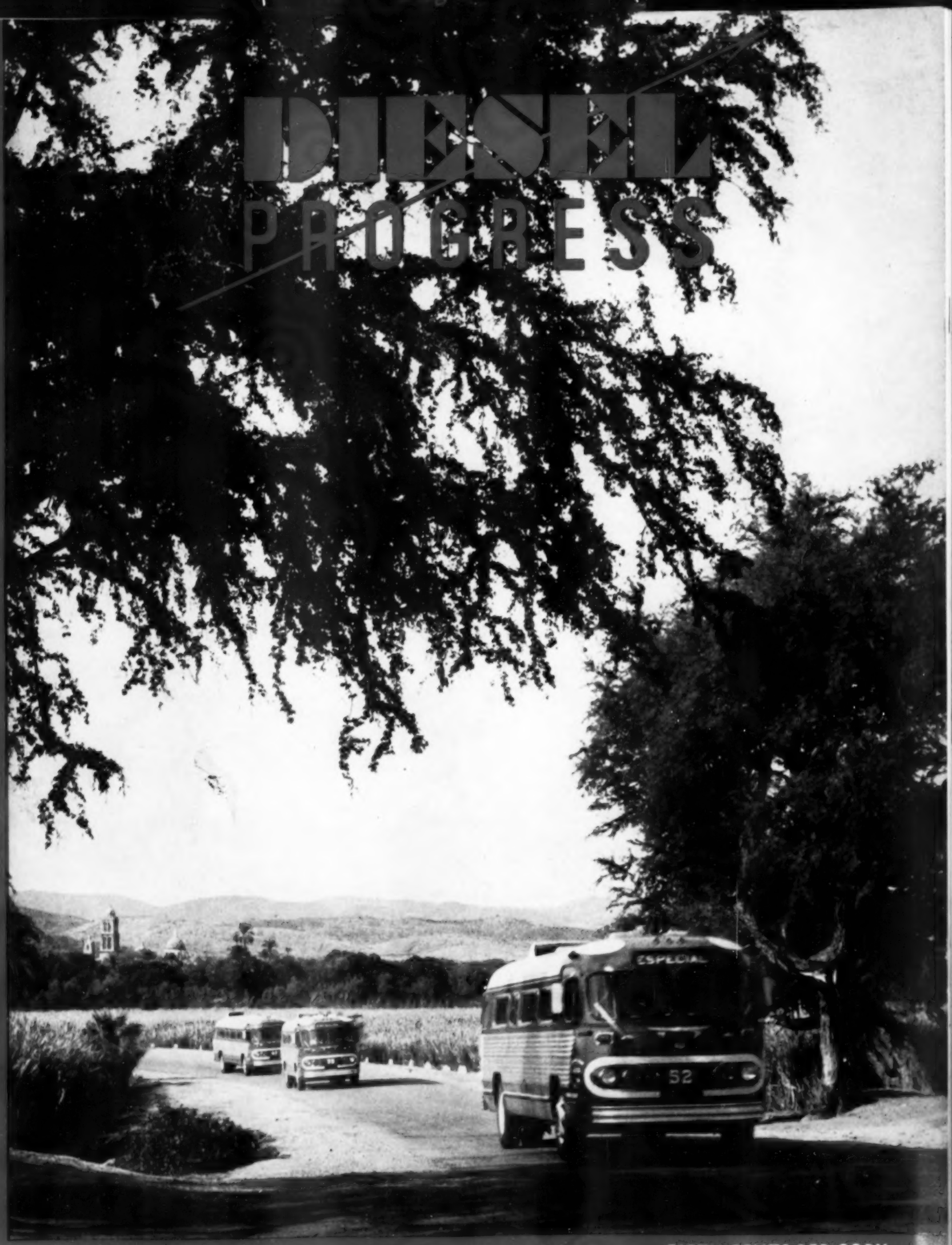
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



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AUGUST, 1955

FIFTY CENTS PER COPY

KEEP ALL RINGS FREE...

No engine can run its best when rings are "half slave, half free." To keep *all* rings free, *all* the time, lubricate with one of the famous *Texaco Ursa Oils*. You'll benefit from the resulting full power performance, low maintenance costs and low fuel consumption.

To meet the requirements of different engines—diesel, gas and dual-fuel—and the range of conditions under which they may operate, there

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Saturday nights, NBC.

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TEXACO

is a complete line of *Texaco Ursa Oils*. Each is especially refined and processed for its particular job. All have in common a high ability to resist oxidation, to keep engines clean and free from harmful deposits, to minimize wear.

These benefits, consistently delivered, account for the fact that—

For over 20 years, more stationary diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

A Texaco Lubrication Engineer will gladly help you select the proper *Texaco Ursa Oil* for your engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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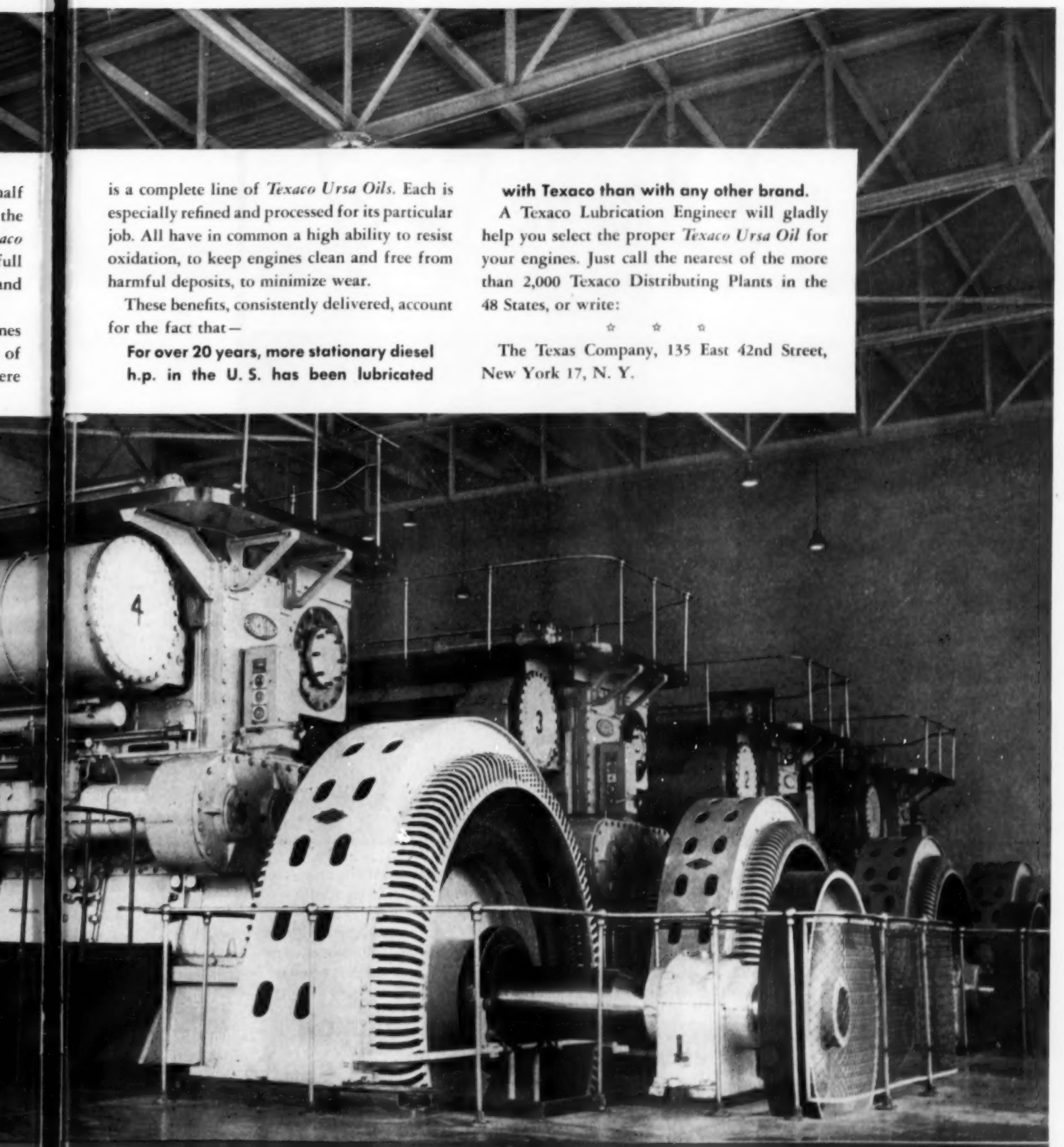
The Texas Company, 135 East 42nd Street, New York 17, N. Y.



URSA OILS

FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Now it's 11 for the PRR

and 2 more on the way

The Pennsylvania Railroad has put two more Diesel-Electric Driven tugs, the PHILADELPHIA and CHICAGO, in service during the last six months. These tugs which were designed by the Marine Department of the Pennsylvania Railroad and built by the RTC Shipbuilding Corporation of Camden, New Jersey, are equipped with General Motors Diesel Engines. These two tugs make a total of eleven tugs in the Pennsylvania Railroad fleet equipped with General Motors Engines and two more are on order for early delivery.

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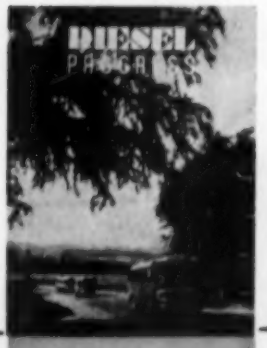

FRONT COVER ILLUSTRATION

Part of a fleet of Cummins-powered Flxible Buses recently placed in service between Mexico City and the Guatemalan border. The diesels are Model JBS-600 with a bhp of 150 at 2500 rpm.

Sun Oil said: "Give us 3 coolers in 1 package"...and Trane delivered

With 1 Trane Fluid Cooler per compressor, Sun Oil now cools (1) engine jacket water, (2) first-stage gas at 110 psia, (3) second-stage gas at 360 psia.

AT WEST HELEN GOHLKE STATION, Sun Oil Company's natural gas compressor installation near Victoria, Texas, each compressor needed three coolers: two with *high pressure* coils for compressed gases and one with *low pressure* coils for cooling engine jacket water.

TRANE was asked: "Can you incorporate all three cooling operations in one compact fluid cooler 'package?' " *One* installation—*one* "*packaged*" *unit*—to solve *three* major cooling jobs.

Sun Oil's specifications called for a header design on the high pressure coils that could meet *all* API-ASME code requirements for unfired pressure vessels. Also, coil tubes had to be cleanable, with *full-access* headers. Framework had to be extremely rugged and durable . . . units had to meet specific horsepower and capacity requirements.

TRANE equipment met *all* these requirements, providing Sun with an effective, economical solution to its problem. In addition, erection time for the TRANE units was substantially less than anticipated.

Chances are TRANE can solve similar problems for you. For TRANE has 30 years' experience covering all types of coils and fans under all types of operating conditions—*plus* a tremendous backlog of supporting engineering design and laboratory test data.

That's why TRANE can say "Yes!" to almost any design requirement—*and deliver.*

For full details call your nearby TRANE Sales Office or write TRANE, La Crosse, Wis.

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One source, one responsibility for: Air Conditioning Heating • Ventilating • Heat Transfer Equipment

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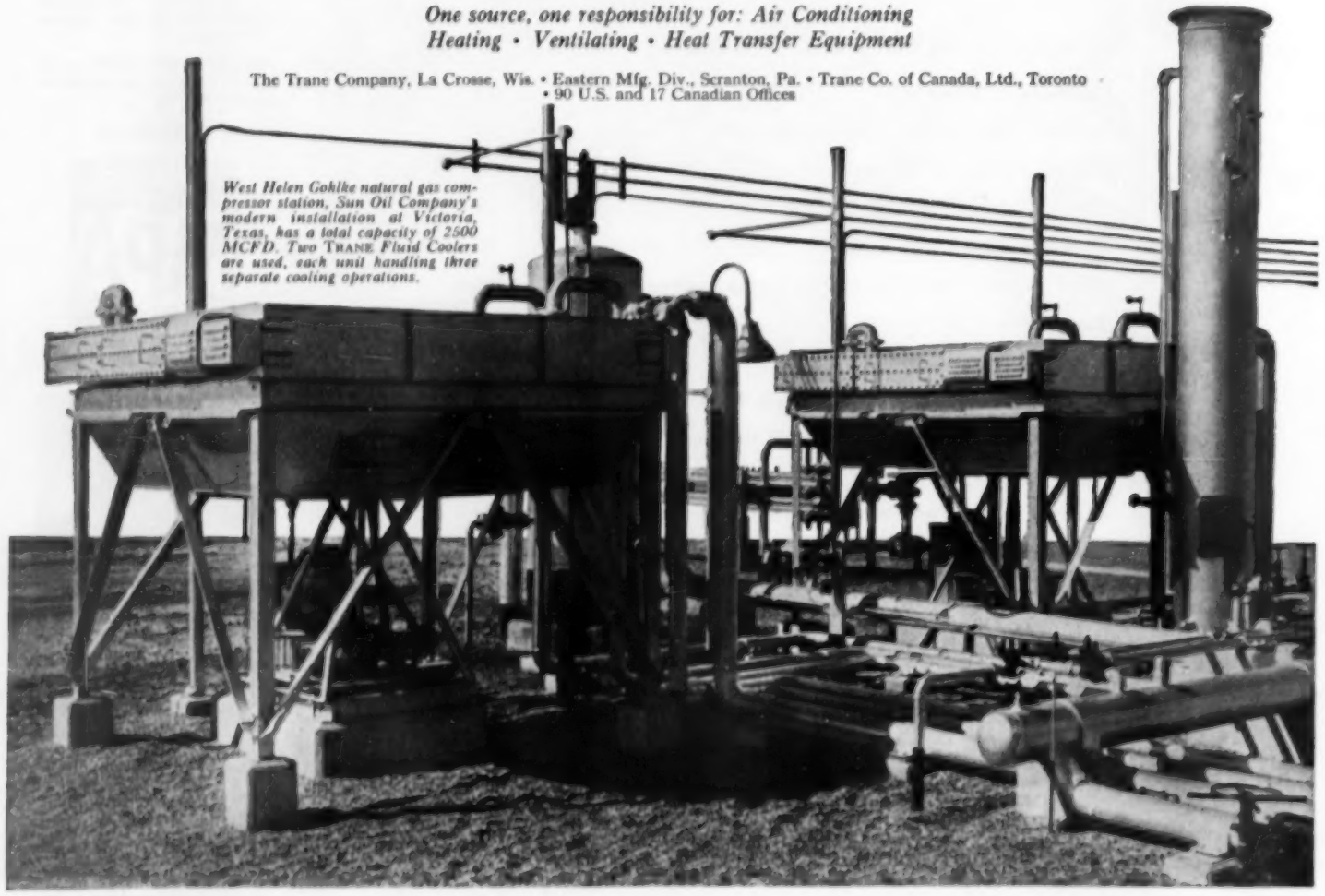

West Helen Gohlke natural gas compressor station, Sun Oil Company's modern installation at Victoria, Texas, has a total capacity of 2500 MCFD. Two TRANE *Fluid Coolers are used, each unit handling three separate cooling operations.*

MORE PULL WITH LESS FUEL!

AiResearch Turbochargers provide rapid response to acceleration demands . . . end objectionable smoking!

Consider what the application of AiResearch Turbochargers to diesel locomotives will accomplish: A team of these small power packages will provide a greater increase in power at smaller cost in space and weight than any comparable turbocharger or supercharger installation.

In addition, specific fuel consumption on a horsepower per hour basis will be far less. Sea level performance will be restored within operating limits at altitude, response to acceleration demands will be rapid and excessive smoking under operating power eliminated. Also, the noise level will be greatly reduced.

Application in other fields will be equally effective, as has already been demonstrated in the remarkable results achieved by the installation of AiResearch Turbochargers on Caterpillar diesel machinery.

AiResearch is the largest producer of small turbomachinery in the United States, with twenty-five *million* hours of experience. This unmatched experience explains why AiResearch Turbochargers lead in power, economy and dependability.
Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

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DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

FAMOUS LAST WORDS:

Let's face it—they won't send out advance warning notices of atom-bomb attacks. They just sneak over and let go when we're least expecting it—without even so much as a declaration of war. The emergency may be an atom bomb or it may be a fire, a flood, a hurricane. It's only good business to be ready for it—whatever it is. Take these precautions TODAY:

- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses. They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

Set the standard of preparedness in your plant city—check off these four simple points NOW.

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

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DEAR MR. ENGINE OPERATOR

The cost of fuel represents 50 to 65% of the total cost of your engine operation. Piston ring leakage increases fuel cost 10 to 15%. This WASTE is not necessary—

Renewal or reboring worn cylinders can be postponed thousands of operating hours. Sealing rings are available that stop all leakage in worn cylinders.

Operating time between ring renewals can be increased 100 to 500%, reducing your maintenance expense.

Cylinder and ring wear can be reduced 50 to 90%, depending upon your selection of piston rings made of wear resisting material.

Daros make piston rings designed to correct these conditions, using special material and design needed for each type ring.

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ONE DAROS INSTALLATION WILL CONVINCE YOU

Very truly yours,

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AB. DAVY ROBERTSONS MASKINFABRIK, GOTHENBURG, SWEDEN
ORGANIZED 1851

(This is ad #5 in a series designed to tell Diesel Operators the important story about DaRoS Swedish Iron Piston Rings.)

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8128 N. Lawndale Ave., Skokie, Illinois
Gentlemen: Send me complete information on DaRoS Rings.

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20 out of 22 crawlers drive through torque converters

. . . and they're all Twin Disc!

Of the 22 crawler tractors working on the first section of the Indiana Toll Road now under construction—*20 are equipped with Twin Disc Torque Converter Drive!*

Why this top-heavy proportion of Torque Converter crawlers? Let's ask H. T. Lattimore, general superintendent for Suber & Co., of Whitmire, S. C., the contractor with the earth-moving contract for the first 12-mile stretch.

"We prefer Torque Converter crawlers," says Mr. Lattimore, "because they give us more usable power, and more power *means more work done every day*. The Torque Converters cut out engine lugging, cut down on shifting and clutching and make it a lot easier for our operators to match tractor power to the load. Operators move more dirt and are less tired after a full day's work on a tractor with Torque Converter Drive."

Throughout the construction industry, more and more contractors are carefully checking the performance of Torque Converter-equipped tractors . . . and arriving at the same conclusions! That's why *all three* of the "Big 3"—Allis-Chalmers, Caterpillar and International, manufacturers of the most powerful crawler tractors now available—have standardized on Twin Disc for their Torque Converter Drive models!

Be sure there is a Torque Converter Drive in the next tractor you order. Check with your dealer today for complete information on Torque Converter Drive—and the tremendous increase in *drawbar pull* it will give your tractors.

Photo—Excavating on the Indiana Toll Road, Suber & Co. is working ten HD-20, six new HD-21, one HD-15AC Allis-Chalmers and three TD-24TC International crawlers—a total of 20 out of their 22 tractors on the job *driving through Twin Disc Torque Converters!*

TWIN DISC
Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division) Rockford, Illinois

The Engineer's Report

CASE HISTORY

PRODUCT RPM Delo Oils

FIRM Bagdad Copper Corp., Bagdad, Arizona

Biggest truck in the world uses RPM DELO Oil!

246,000 POUNDS TOTAL LOAD, 48 tons of truck and 75 tons load, are hauled out of the Bagdad Copper Corp.'s ore pit at Bagdad, Arizona, by the two 350 h.p. supercharged diesels in this unit. RPM DELO Special Lubricating Oil is used in the engines as specified by Mr. Ernest Dickie, General Manager of Bagdad, on the basis of his years of experience with RPM DELO Oils in many other heavy-duty engines.

The big truck, described as the largest in the world, was designed by Mr. Dickie and engineers of Dart Truck Co., builders. Power is transmitted through 3-stage torque converters. All controls are powered.

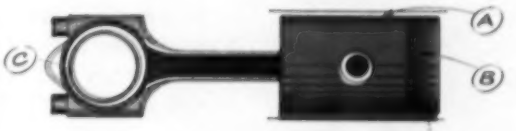
FREE FOLDER tells you about all the RPM DELO Oils and how they meet every heavy-duty engine condition. Write or call for it today.

FOR MORE INFORMATION about petroleum products of any kind or the name of your nearest distributor, write or call any of the companies listed below.

RPM DELO LUBRICATING OILS

TRADEMARKS "RPM DELO" REG. U. S. PAT. OFF

How RPM DELO Oils reduce wear, corrosion, oxidation in all heavy-duty engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

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A New PM TOOL for Diesel and Gasoline Engines

SAVE Time, Money, Oil and Engines with the Shell ADC* Oilprint Analysis

Now—operators can test crankcase oil in the short time allotted for re-fueling and oil level checks. The Shell ADC Oilprint Analysis gives a practical and accurate oil evaluation in minutes.

ADC Oilprint Analysis means big savings when used in your preventive maintenance program . . . gives valuable information on engine and oil conditions. It answers the question "When do I change my oil?" thus eliminating the draining of usable oil and the risk of using oils loaded with contaminants.

See for yourself how the new Shell ADC Oilprint Analysis can save you real money in preventive maintenance. *Trademark

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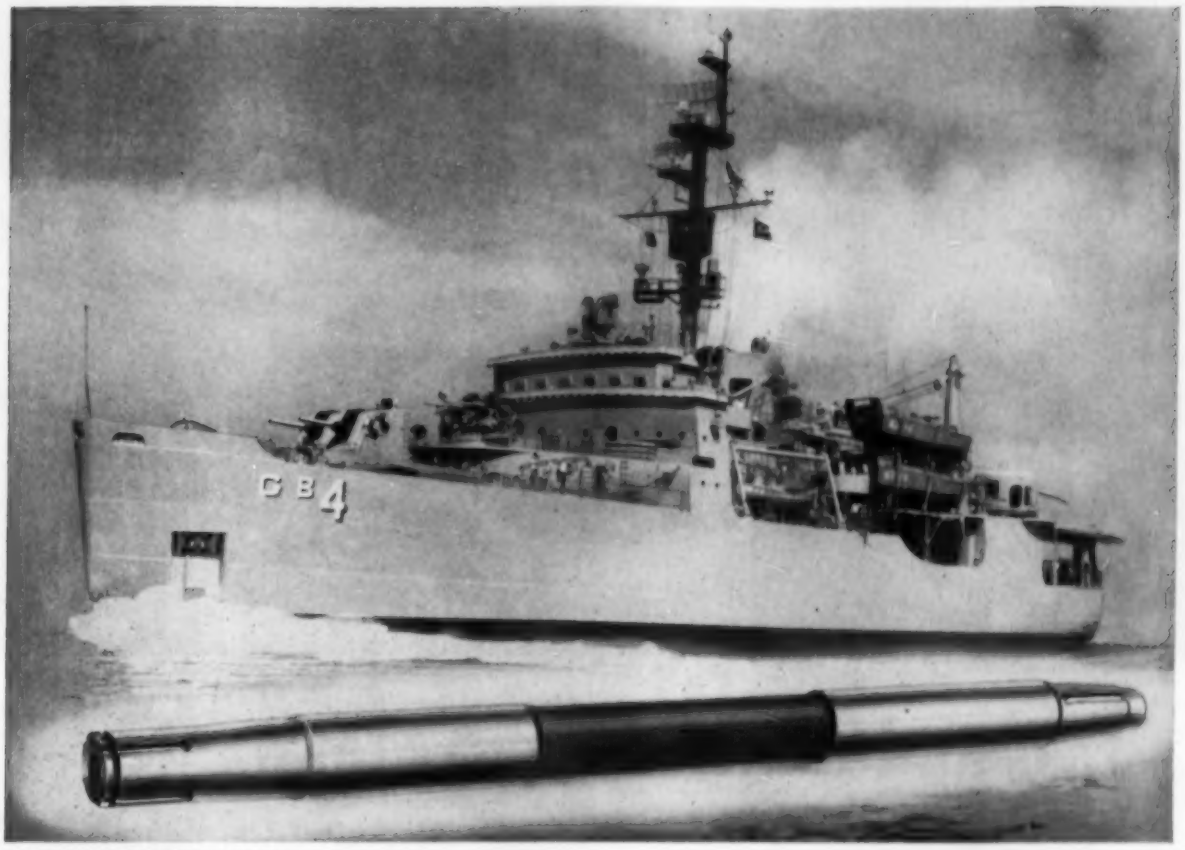


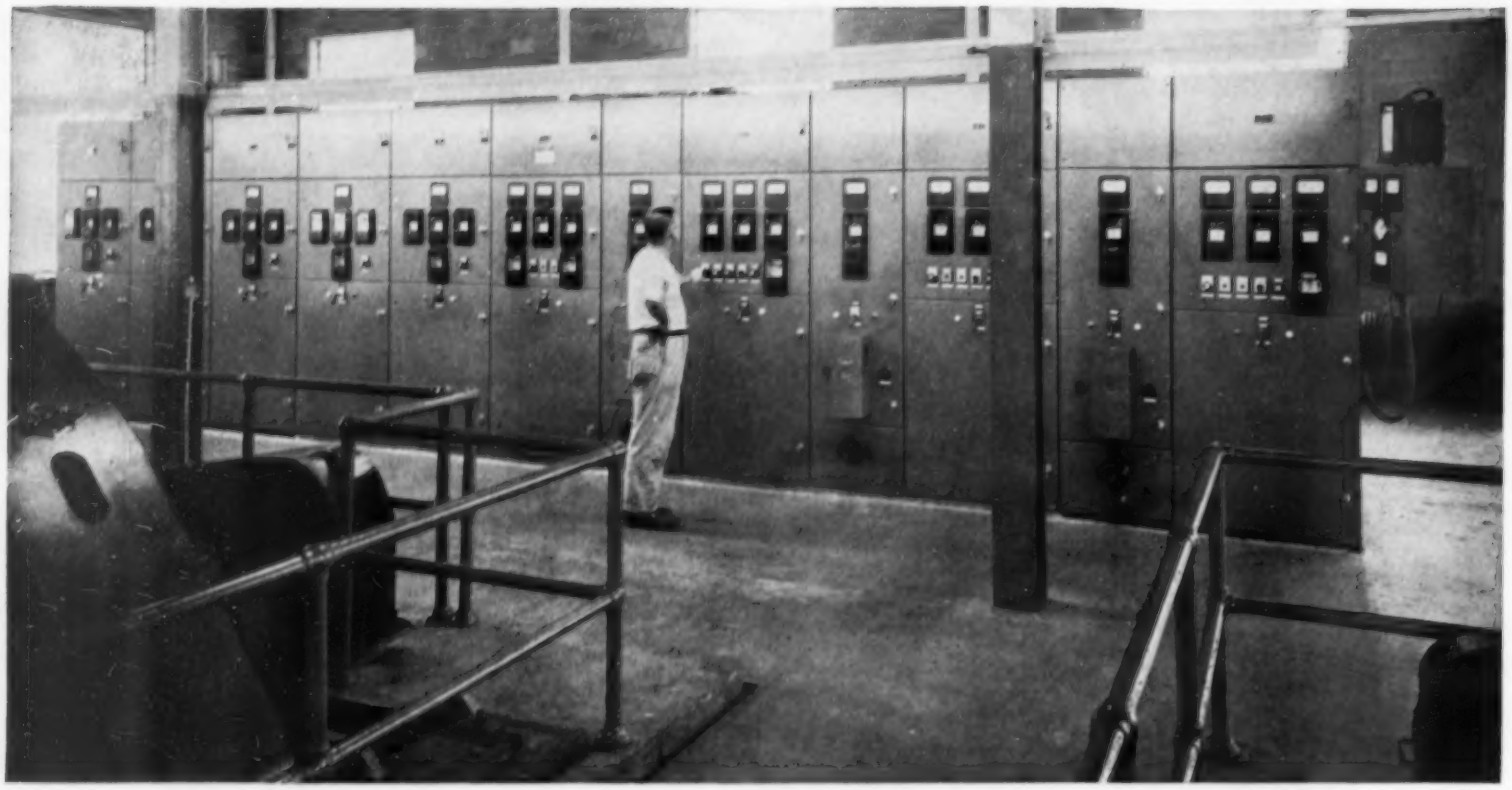
OFFICIAL UNITED STATES NAVY PHOTOGRAPH
COURTESY OF THE INGALLS SHIPBUILDING CORPORATION

HORSEPOWER GOES TO SEA —

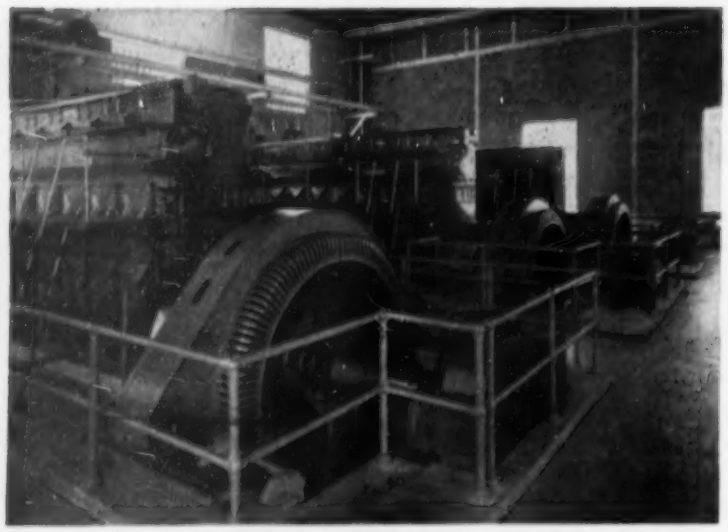
Another Erie Shaft Drives this Navy Ice Breaker

We use the word "another" because we have produced literally thousands of forged steel components for Diesel and Marine use. From raw material to finished product, under one control and with a single responsibility, forged steel cranks, drive shafts, connecting rods, special forgings for processing equipment and a diversity of steel castings for heavy industry are our daily accomplishment. Isn't it quite logical, then, to place your forged and cast steel components requirements with us? We shall welcome opportunities to consult with you.

ERIE FORGE & STEEL CORPORATION
ERIE, PENNSYLVANIA



...brand new from the ground up



THREE TIRELESS E-M GENERATORS work at the new Bellefontaine plant, direct-connected to powerful diesels. E-M Generator frames are welded, rolled steel. Coils are specially insulated for high dielectric strength. Operating characteristics are perfectly matched to companion E-M Switchgear.

All major electrical equipment is E-M at new Bellefontaine, Ohio power plant

The Bellefontaine engineer in the picture above is operating a masterpiece of modern Switchgear design.

He can see that the E-M Switchboard has a clean, sleek, attractive appearance. And he knows that behind this shiny face is a Switchgear system second to none. These are the reasons E-M has been chosen prime supplier of electrical equipment at Bellefontaine and at so many other new plants:

E-M Switchgear and Generator engineers are *specialists* . . . they select and blend together pre-engineered components into integrated combinations *matched exactly* to the individual plant's requirements. It takes extra-value engineering to do this well, as standard combinations just don't come close enough to intricate modern plant specifications.

E-M also applies high standards of quality . . . above ordinary commercial standards . . . to all components. Circuit breakers, disconnects, switches, meters, panels and accessories . . . all have an extra margin of durability . . . a bonus value that will add years to plant operating life.

Your nearest E-M field engineer will be glad to tell you how E-M tackles such a job, and what successes we have had. For general background, write for Publication No. 194 on E-M Switchgear and No. 196 on E-M Generators.

ELECTRIC MACHINERY MFG. COMPANY

MINNEAPOLIS 13, MINNESOTA

This is the E-M Equipment at Bellefontaine:

THREE 1250 kva, 360 rpm, 2400/4160 volt E-M Engine-Type Synchronous Generators . . . 1000 kw at 0.8 leading power factor.

THREE 15 kw, 1750 rpm, 125 volt shunt-wound Belted Exciters.

TWELVE-PANEL SWITCHGEAR, *including:* Six generator and exciter panels, with 600 amp. d.c. electrically-operated breakers and heavy duty oil switches with 50,000 kva interrupting capacity.

Five feeder panels with induction-type overload relays. Swing panels with synchroscope, frequency meter and synchronizing lamps.

Incoming line panel and panel mounted voltage regulators.

4200-TPA-2119

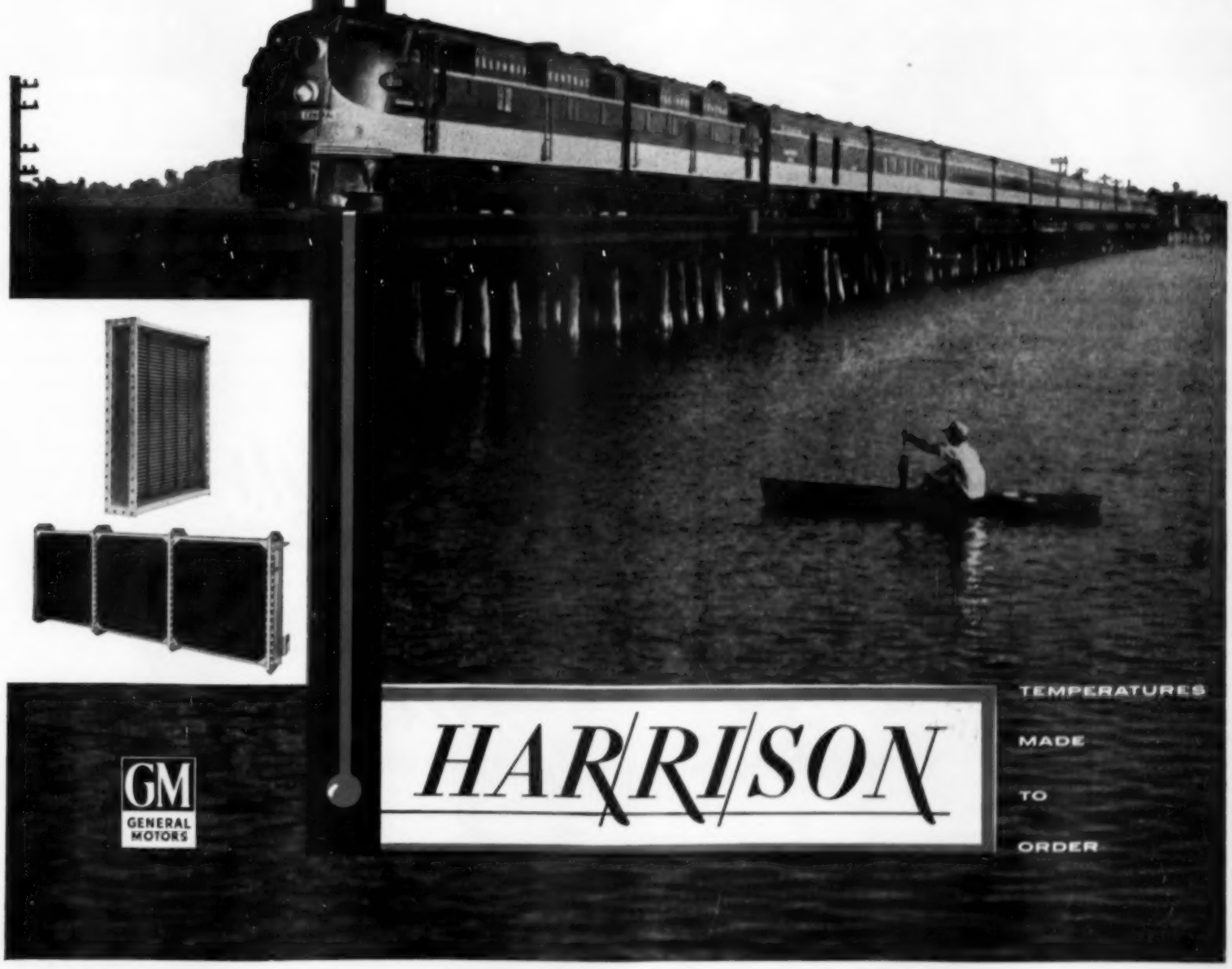
SPECIALISTS IN SWITCHGEAR AND GENERATOR ENGINEERING

E-M

Heat's "off limits" for the Panama Limited

From Chicago to Springfield . . . from Memphis to New Orleans streaks the Panama Limited, crack Illinois Central streamliner on the "Main Line of Mid-America"! But Harrison heavy-duty lube oil and jacket water coolers are on the job . . . beating the heat . . . keeping the engines cool! Designed to cool the most modern Diesel engines, Harrison coolers are rugged, reliable, compact. That's why you'll find the majority of up-to-date locomotives on the road today depend on Harrison heat exchangers for efficient cooling and peak performance. If you have a cooling problem, look to Harrison for the answer.

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N.Y.



GM GENERAL MOTORS

HARRISON

TEMPERATURES MADE TO ORDER

Broadens grader working capacity

NOW YOU can get Allison TORQMATIC Converters in the fast-running, smoother-operating Austin-Western Super 88 Power Grader.

When you do you'll get a grader that's easier to operate because its TORQMATIC Converter cuts the number of shifts needed to complete a pass or make a cut—allows the operator to concentrate on his bladework.

You'll get a grader that costs less to operate because the TORQMATIC Converter automatically keeps the engine running in its most efficient power range—broadens the engine's working ability by increasing engine torque 2½ times—holds power to the load at all times.

And you'll get a grader that costs less to maintain, too. The TORQMATIC Converter provides a shock-absorbing hydraulic cushion that protects grader components from shock damage—boosts engine life by preventing engine lugging and stalling.

Allison's 200-300 Series TORQMATIC Converters in the Austin-Western Graders carry their own oil supply—have a simple dip stick to check oil level. They're the first converter packages in the 40-150 horsepower range on the market with an integral oil cooler, sump and charging pump.

You can get Allison TORQMATIC Converters in a wide range of models for both gasoline or Diesel engines from 40 to 400 horsepower – TORQMATIC Transmissions for applications up to 300 horsepower. Ask your equipment manufacturer or dealer about Allison TORQMATIC DRIVES next time you buy or write for more information to Allison Division of General Motors, Box 894D, Indianapolis 6, Indiana.

GM TORQMATIC

Allison
TORQMATIC DRIVES

DIESELS INSTALLED IN SOUTHEASTERN PIPE LINE

Six 1600-Hp Fairbanks-Morse Opposed-Piston Engines Drive 1310 Gpm Pumps In Three Stations; Help Increase Maximum Daily Thru-Put To 41,728 Barrels In 483 Mile System

This pumping station at Wewahitchka, Fla., is typical of three recently built by Southeastern Pipe Line. Six 1600-hp Fairbanks-Morse diesels provide power. Note Burgess-Manning exhaust snubbers.

Route of the 483-mile pipe line is shown here. The new diesel pumping stations, located at Wewahitchka, River Junction and Newton, went into service January 1, 1950 with F-M opposed-piston diesels.

THE same diesel that long has powered tankers and towboats in moving vast quantities of petroleum products over water is now moving them over land. One of the first companies to use opposed-piston diesels in pipe line service is Southeastern Pipe Line Co., Atlanta, Ga. This report shows that the stations concerned were pumping more than 97% of the time in the 56 months since installation of the diesels. The new engines supplied power at an average fuel consumption of only .37 lb. per hp/hr.

To meet a booming demand for petroleum and petroleum products in the industrially awakened South, the Southeastern Pipe Line Co. has expanded its 483-mile system between Florida's Gulf Coast and Chattanooga, Tenn. The company has constructed three pumping stations in Florida and Georgia, each powered with two 1600-hp Fairbanks-Morse opposed-piston diesel engines, and has increased the capacity of two existing motor-powered stations by 300 hp each. The result is that, without increasing the 1200-psi pressure maximum in the six-and-eight-inch line, the system's average daily thru-put has been increased from an average of 28,000 bbls. to 38,200 bbls., with peaks reaching 41,728 bbls. per day. At the indicated pressure, this is considered maximum flow for the system, short of constructing parallel facilities.

The three newest diesel pumping stations are located at Wewahitchka, Fla., River Junction, Fla., and Newton, Ga. Of pre-fabricated steel construction and measuring 80x40 ft., they are designed for one-man operation, as are all 14 pumping stations in the system. Each is equipped with two Model 38D8-⅛, 10-cylinder, 8-1/8x10-in., Fairbanks-Morse engines, rated 1600 hp at 720 rpm. Each engine drives a 6-stage, flooded-suction, centrifugal pump, equipped with 11-¾-in. impellers and rated 1310 gpm at a discharge pressure of 1200 psig. The driving arrangement for each pump includes a through-bulkhead shaft, flexible coupling, and a speed-increasing gear of 1 to 6.583 ratio which steps engine speed of 575 rpm up to 3785 rpm at the pump.

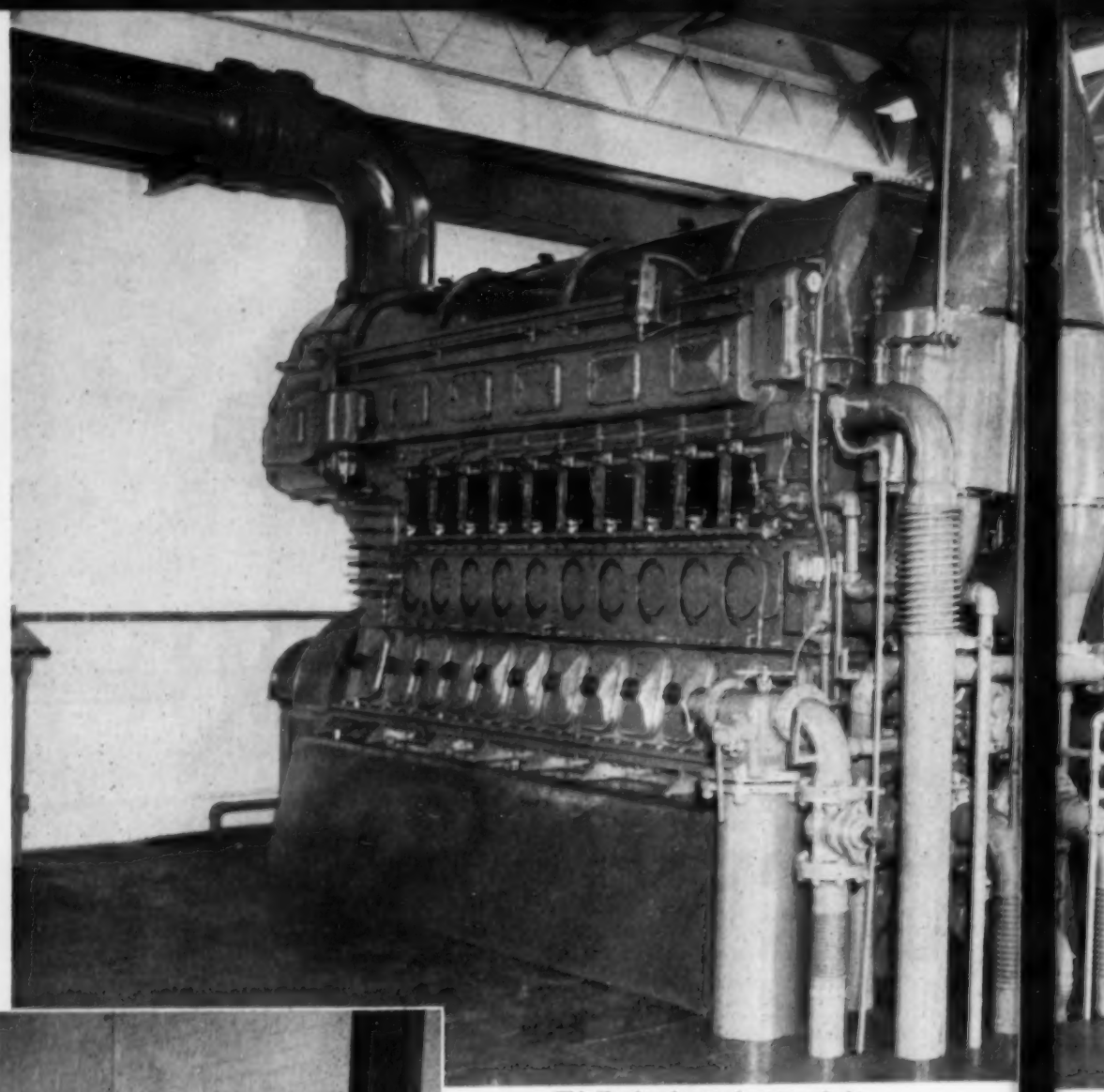
The two 1600-hp engines at each station are operated alternately, each having sufficient power to handle the station's average flow of 1650 bbls. per hour. This arrangement provides each station with 100% standby capacity under normal conditions. Average suction pressure is 100 lbs. and average discharge pressure is 1150 lbs.

The three stations went into operation January 1, 1950. Since that time they have been pumping regular and premium gasolines, diesel oil, fuel oil and kerosene on around-the-clock basis. In their first 56 months of service they were actually pumping products 39,286 hours, 39,367 hours, and 40,430 hours, respectively, out of a possible total of 40,896 hours, handling a volume of 63,719,187 bbls. of

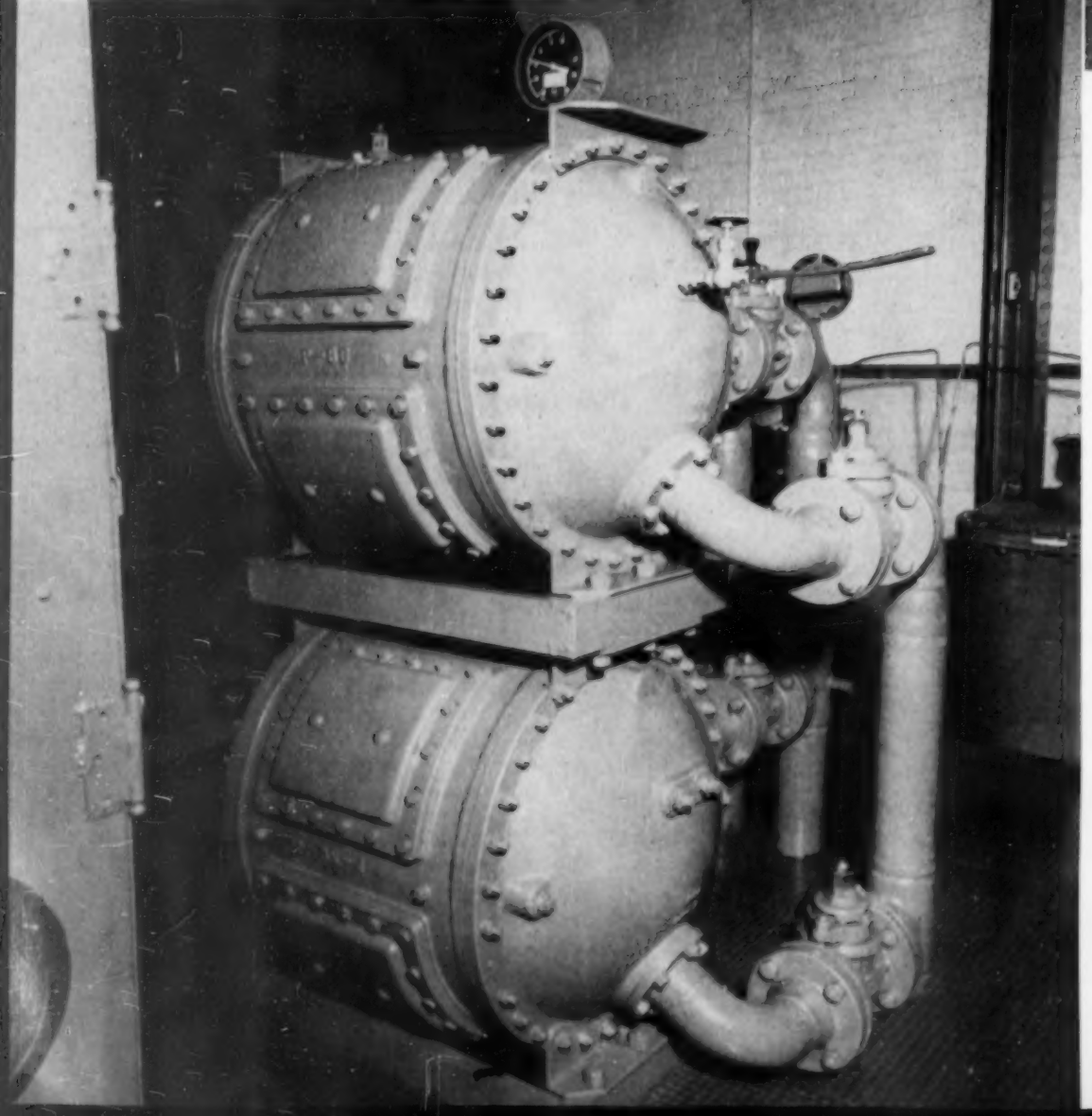
products. Despite the fact that they are operated at an average load of from 800 to 850 hp, the average fuel consumption of the six O-P diesels throughout period was estimated .37 lbs. of fuel per hp/hr.

The two motor-powered pumping stations that were expanded at the same time, are located at Marshallville, Ga. and Bainbridge, Ga. At Marshallville, a 300-hp motor-driven pump was installed to supplement the output of a similar unit of equal capacity and at Bainbridge one of two existing 300-hp units was replaced with a 600-hp motor-driven pump, the remaining 300-hp unit being retired to standby duty. As part of the same expansion program, the company doubled the capacities of the Albany, Americus, Macon and Griffin (all in Georgia) stations by operating two 300-hp motor-driven pumps installed at each station simultaneously instead of alternately.

The Southeastern Pipe Line Co. was organized in October, 1939, with construction of the pipeline getting underway the following January. The system's original design was based on an average thru-put of 18,000 bbls. per day, handled by a total of five pumping stations. World War II was in



Powering the 1510-gpm centrifugal pumps at each new station are two Model 38D8⅛ 10-cylinder F-M opposed-piston diesels. Photo shows Purolator full-flow filters, Woodward governors, Mercoid controls, and American Brass flexible connections on water and lube lines.

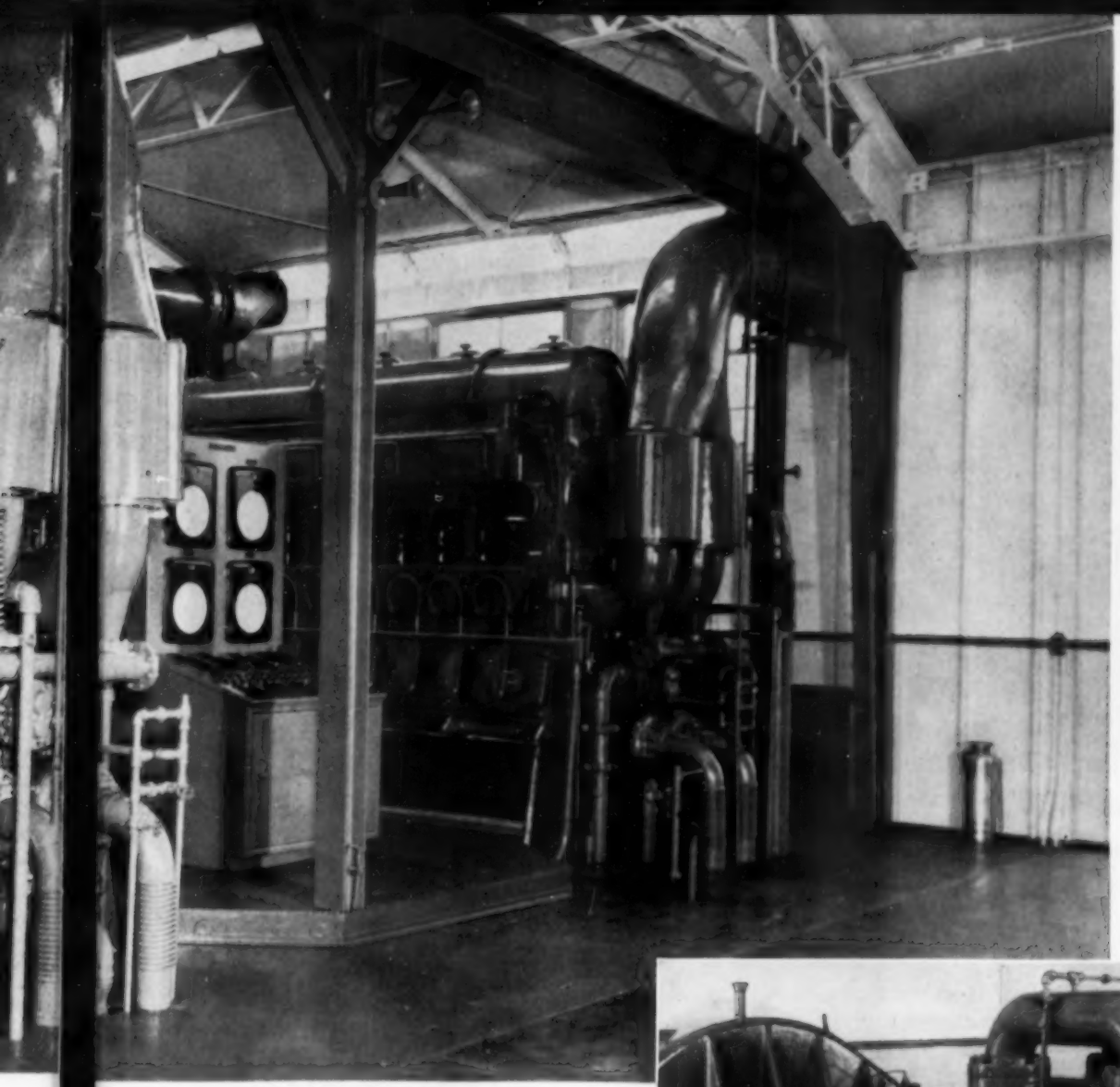


This Harrison heat exchanger cools the high-detergent type lube oil, with fresh jacket water used as the coolant. An engine-driven pump circulates the lube oil to the strut-tube type Harrison unit.

progress, however, and at the government's request, the partially-completed system was extended to include 11 pumping stations with an average daily thru-put of 28,000 bbls. Thus expanded, the pipeline was completed on December 19, 1941, 12 days after the attack on Pearl Harbor. It became the first pipeline to begin operations in the southeastern section of the country.

The SPL system originates on the Gulf Coast at Port St. Joe, Fla., extends northward into Georgia and Tennessee and terminates on the Tennessee River, just below Chattanooga. It is supplied entirely by water-borne shipments, the sheltered harbor in St. Joseph's Bay being deep enough to accomodate tankers of the T-2 class as well as barge trains arriving from Texas via the Intracoastal Canal. The pipeline's total length is 483.5 miles. There are 348 miles of 8-inch pipe between Port St. Joe and Atlanta, 109 miles of 6-inch pipe extending from Atlanta to Chattanooga, 4.5 miles of parallel 6-inch pipe between the Chattanooga terminal and the Tennessee River terminal, and a 17-mile lateral of 8-inch pipe extending from Atlanta to Doraville, Georgia.

As extended in 1949, the system includes 14 pumping stations located at intervals of from 23 to 56



Taken in the Newton, Ga., station, this photo shows the 6-stage, flooded-suction centrifugal pumps—one driven by each diesel. Each pump is rated 1310 gpm at a discharge pressure of 1200 psig.

miles. There are five dieselized stations, located at Port St. Joe, Wewahitchka, Blountstown, River Junction (all in Florida) and Newton, Ga., and nine motor-powered stations, located at Bainbridge, Albany, Americus, Marshallville, Macon, Griffin, Chattachoochee (Atlanta), Rome (all in Georgia) and Chattanooga, Tenn. In addition, terminals are maintained at Doraville, Ga., and on the Tennessee River.

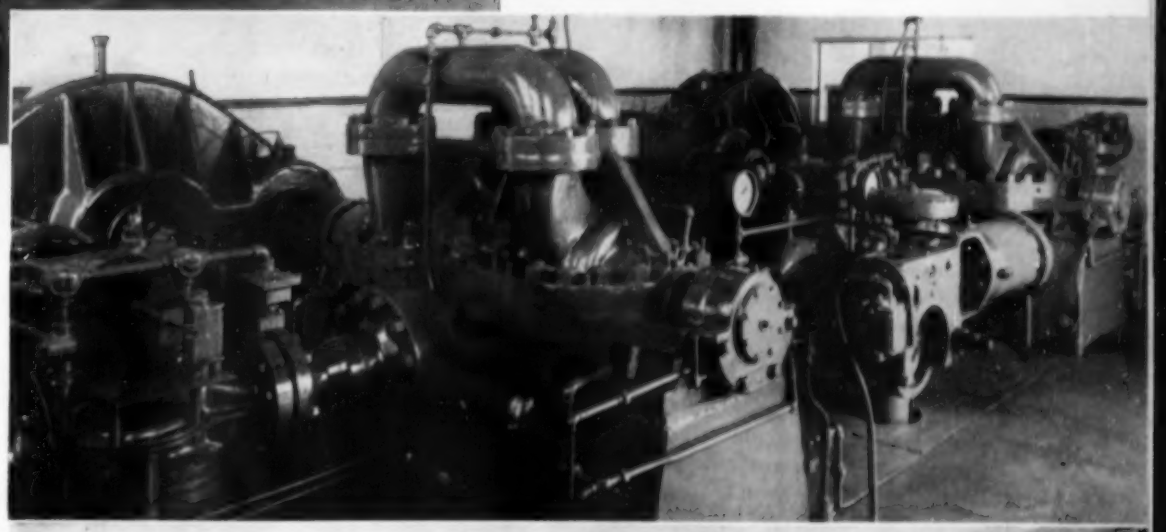
The combined available horsepower of these 14 stations is 17,300, of which 12,300 hp is supplied by diesels and 5,000 hp by electric motors. The Port St. Joe and Blountstown stations are each equipped with three 450-hp diesels, driving parallel 8-stage centrifugal pumps through speed-increasing gears. The motor-powered stations, with the exception of Chattahoochee, Ga., and Chattanooga, Tenn., each have two series-connected 4-stage centrifugal pumps, those on the 8-inch line being powered with 300-hp motors and those on the 6-inch line by 200-hp motors. The Chattahoochee pumping station has two series-connected pumps, driven by

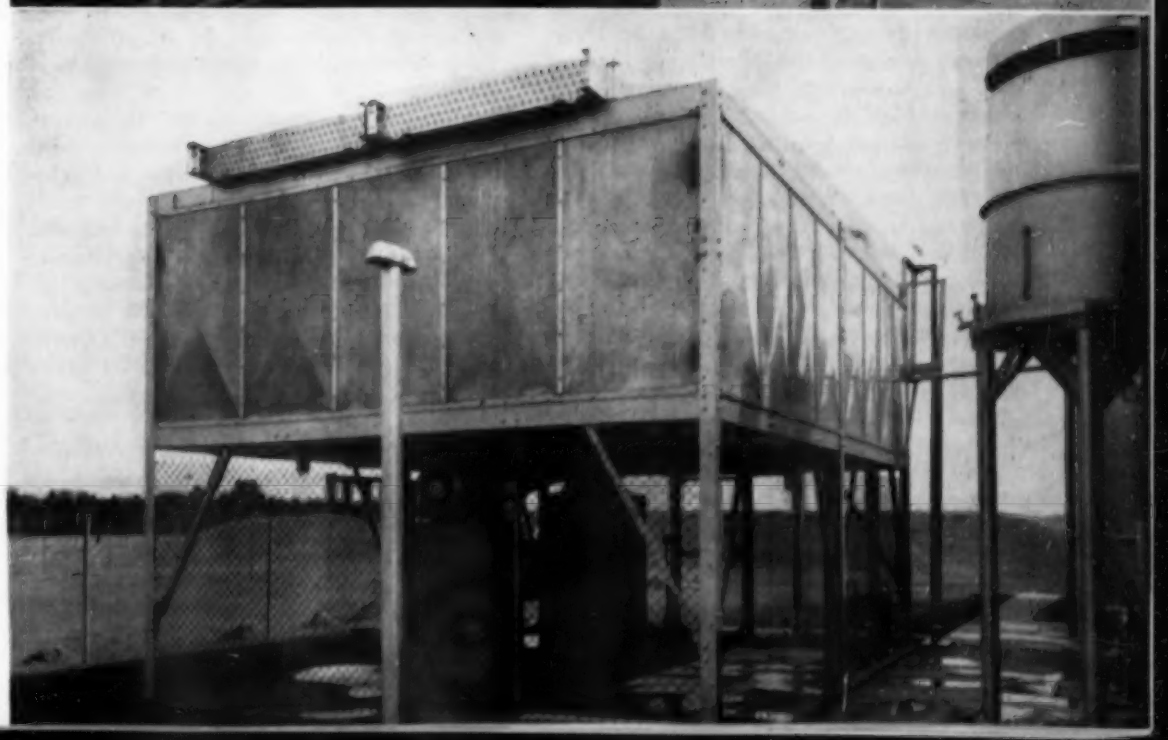
200-hp motors, which deliver products into the 6-inch line, and one 300-hp motor-driven unit which discharges into the 8-inch line to Doraville, Ga. A 200-hp pump at Chattanooga delivers products into the parallel 6-inch line to the River terminal.

The Doraville terminal is located adjacent to the Plantation Pipe Line Company's facilities, permitting products from the SPL system to be transferred into the Plantation system for reshipment into the Carolinas. SPL's Tennessee River Terminal unloads directly into barges for delivery to points along the river and its tributaries. Shippers provide their own tankage facilities at each delivery point.

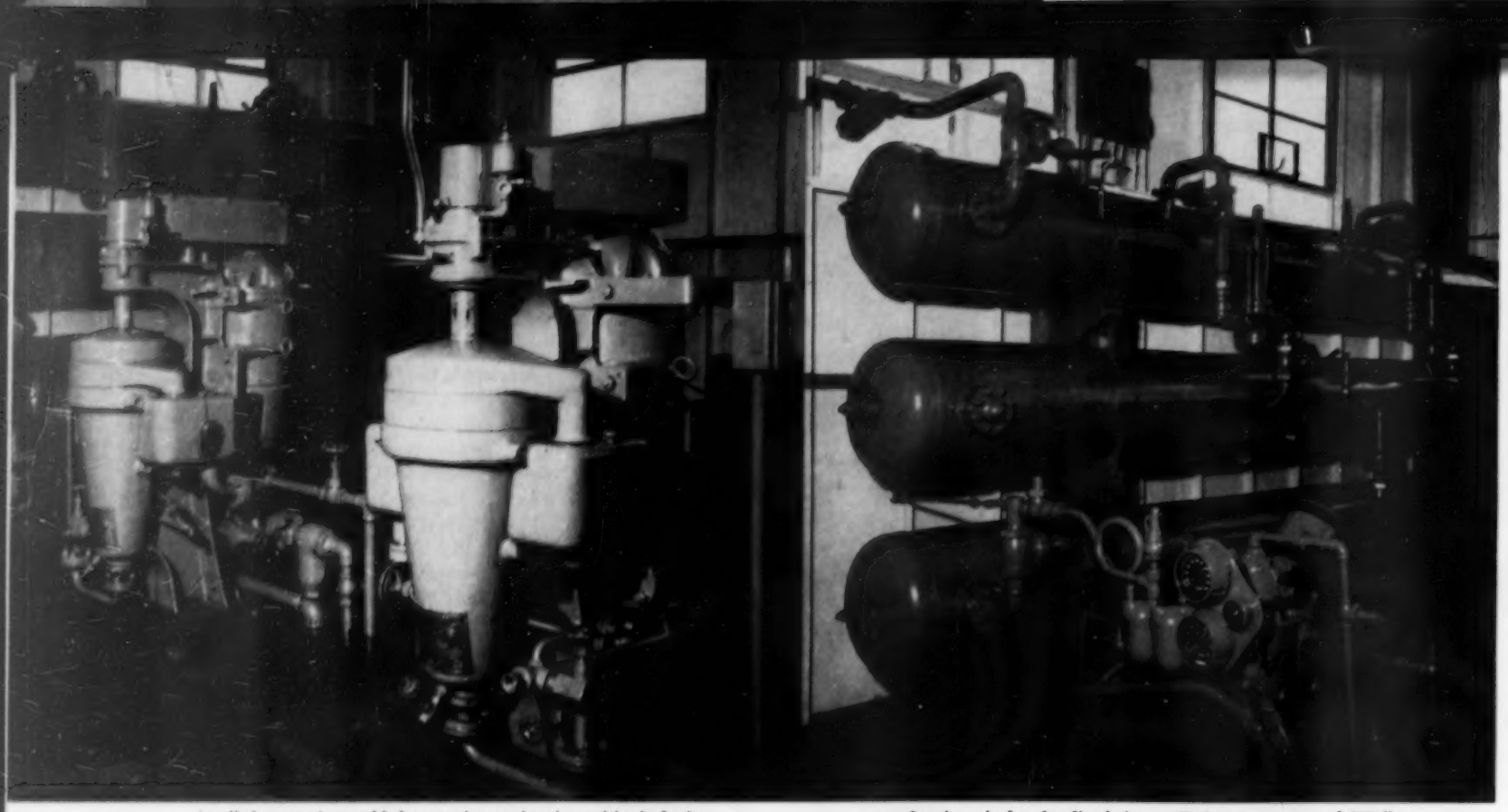
Gasoline, diesel oil, fuel oil and kerosene are put into the line at Port St. Joe in slugs of not less than 25,000 bbls. each, the products moving through the 8-in. line at approximately 4.5 mph and through the 6-in. line at approximately 3 mph. Full and immediate control is provided by a teletype communications system which links each pumping station with the Atlanta office.

In order to facilitate one-man operation of each pumping station, automatic controls and safety devices have been included wherever possible. All pumps are protected against low inlet and high outlet pressures, hot pump casings, excessive pump





Jacket water from each engine's closed cooling system is cooled in a Fluor forced-draft cooler. Also shown here is the Continental "Whirlwind" air-intake filter, serving one of the two main engines.



At all three stations, added protection against impurities in both fuel and lube oil is afforded by Sharples centrifuges. Photo was made at Newton, Ga.

Starting air for the diesels is supplied at a pressure of 250 lbs. by a Worthington compressor. A 600-lb. tank (top) and two 250-lb. tanks, plus a 175-lb. tank (not shown) are used for storage.

bearing temperatures and low or excessive flow. All electric motors are protected against excessive bearing temperatures and all diesel engines are protected against low lube oil pressure and high jacket water temperature.

In addition to the two O-Ps, there is installed at each station a 150-hp, 1200 rpm diesel engine, driving a 50-kw, 3-phase, 60-cycle alternator, which supplies power for the motor-driven auxiliaries and for lighting purposes. All three diesels draw fuel from the same 5000-bbls. storage tank and the only available means of measuring fuel consumption is a conventional sounding device. The result is that the .37 lbs-per-hp/hr figure represents the average fuel consumption for all six O-Ps and for all three diesel-generator sets combined.

Petroleum products enter each of the stations at an average pressure of 100 lbs., passing through pneumatic plug valves, which are controlled from the station's gauge panel by 150 lbs. of air. These valves are so arranged that the main-line flow can be by-passed around the pumps when necessary. Before reaching the pumps, the products flow through a hay tank, where impurities are removed through a shredded-wood filter and then into a wet well. The pumps discharge at a pressure of 1150 lbs. through another set of plug valves into the main line. A compact meter board installed between the two O-P engines at each station provides a continuous record of pressures and volume of flow. Twenty-four-hour recording meters chart the pressure differential before and after the hay tank, the station flow, the station suction and discharge, and the pump suction and discharge.

Fuel for all diesel engines is sent through the main line and is drawn off at each of the three O-P powered stations into a 5000-bbl. storage tank. It is then sent through, or by-passed around, a fuel oil centrifuge to a single 2200-gal. day tank by a 50-gpm rotary pump, driven through 4.15-to-1 reduction gears by a 2-hp, 1715-rpm motor. From this day tank, the fuel flows by gravity to each engine, passing through a duplex filter before reaching the engine-driven supply pump on each O-P.

A high detergent lube oil is stored at each of the new stations in a 2200-gal. tank and is transferred to the crankcase of each O-P by means of a 50-gpm, motor-driven pump similar to the fuel oil transfer pump just described. It is circulated under pressure through each O-P by an engine-driven pump, passing from the engine through a strut-tube type cooler, through a full-flow strainer, and then back to the crankcase. A by-pass line from the pressure side of the engine-driven circulating pump carries a continuous flow of lube through a separately mounted cartridge-type filter for added protection. Lube oil periodically drained from each crankcase is stored in a 570-gal. storage tank before being run through a centrifuge by the 50-gpm transfer pump. It is then sent to a 570-gal. clean oil tank.

Soft, fresh water, to which a rust inhibitor is added, is drawn from a deep well at each station and is circulated through the cylinder jackets and to the pistons for cooling by means of an engine-driven pump. It passes from the engine to the strut-tube lube oil cooler where it acts as a coolant, and then to a forced-draft evaporative cooler located at the rear of the station. A small by-pass from the pressure-side of the circulating pump sends a continuous flow of jacket water to the lube oil coolers installed on each speed-increasing gear.

Starting air for each O-P is supplied at a pressure of 250 lbs. by a two-stage air compressor, driven by a 7½ hp, 1750-rpm motor. Compressed air for this and other purposes is stored in four storage bottles. Scavenging air is drawn from the outside through an oil-bath type filter. It is sent to each cylinder by a positive-displacement blower, driven off the upper crankshaft. Exhaust gases are expelled through vertical snubbers, one mounted at the front and one at the rear of the building.

With this equipment, installed at its three newest dieselized stations, the Southeastern Pipe Line Co. is pumping a maximum flow of petroleum products through its 483-mile system in an attempt to feed the South's booming industry and population. Working around the clock, the six new O-Ps have taken up whatever room for expansion remained in the system and are contributing high efficiency and dependability to SPL's all-out efforts to keep the South growing.

List of Equipment

(The following list applies to all three stations.)

Main engines—Fairbanks-Morse Model 38D8⅛, 10-cylinder, 8⅛x10 opposed-piston diesels, rated 1600 hp at 720 rpm.
Main pumps—Worthington.
Speed-increasing gears—Worthington.
Governors—Woodward.
Duplex fuel oil filters—Commercial Filter.
Fuel oil and lube oil centrigues—Sharples.
Fuel oil and lube oil transfer pumps—Blackmer.
Lube oil cooler—Harrison.
Full-flow lube oil strainer—Purolator.
By-pass lube oil filter—Purolator.
Main line plug valves—Nordstrom.
Air-intake filters—Continental Air Filter.
Exhaust snubbers—Burgess-Manning.
Gauge panel—Westinghouse.
Jacket water cooler—Fluor.
Air compressor—Worthington.
Diesels (driving generator) —Cummins.
Generator—Electric Machinery.
Switchboard—Westinghouse.

Named after a great, long-time leader of the Mississippi Valley Association, the *Lachlan Macleay* was christened by Mrs. Donald Macleay, a daughter-in-law. In the picture, left to right: Herman T. Pott, president, St. Louis Shipbuilding & Steel Co., Mrs. Macleay; Charles J. La Mothe, president, St. Louis Terminal Warehouse Co., Donald Macleay; Mrs. Pott and Mrs. La Mothe.

Four Cleveland GM diesels make this new towboat the most powerful on the Big Muddy. Each engine delivers 900 hp at 750 rpm, and each is equipped with a Marquette governor. Flying the FBL's black house flag, the boat's superstructure is painted a bright yellow, her hull and trim a dull black.

"LACHLAN MACLEAY" MASTER OF THE MISSOURI

By A. D. BURROUGHS

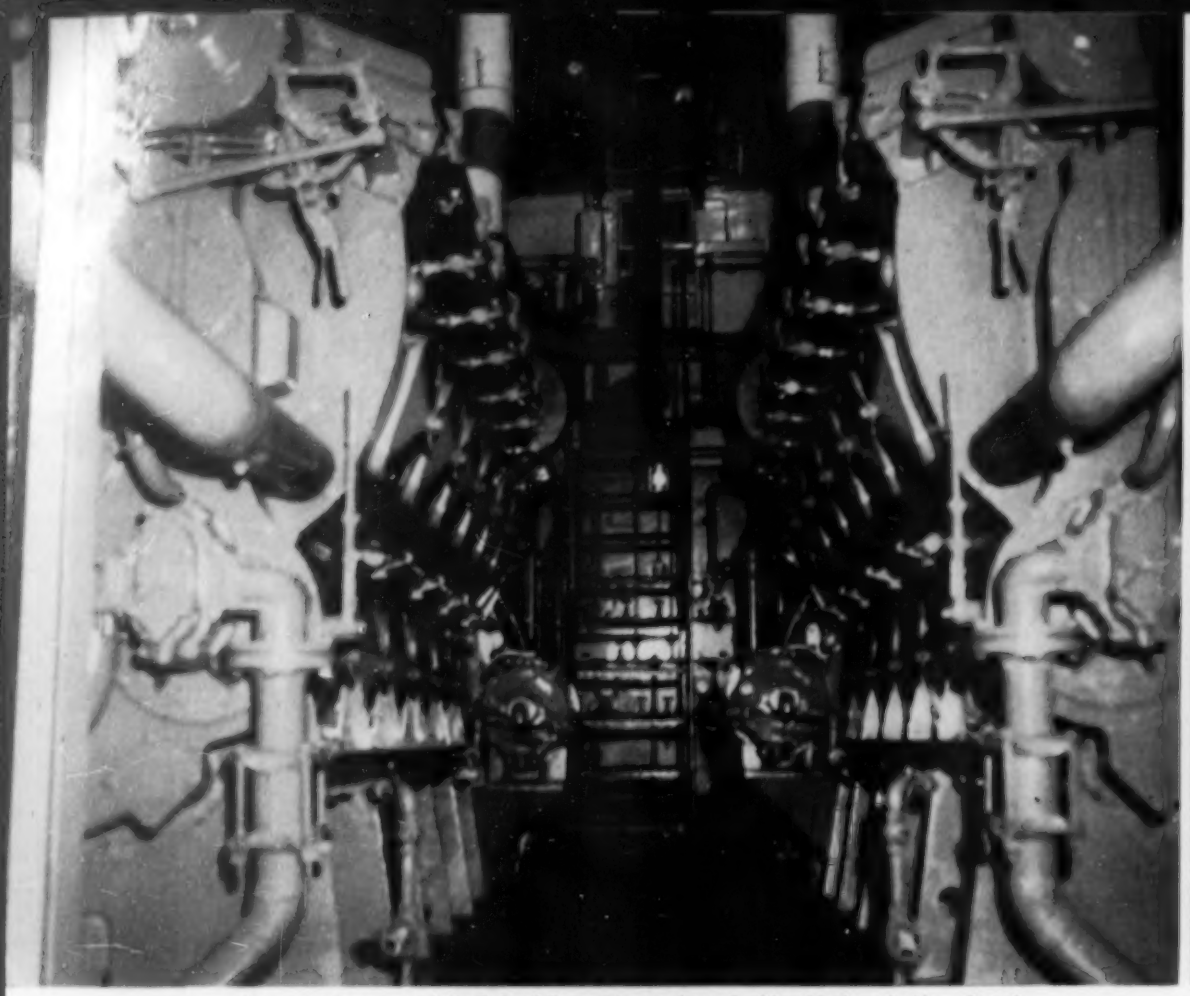
NOW at work for her owners, Federal Barge Lines, Inc., is the *Lachlan Macleay*. Built by the St. Louis Shipbuilding and Steel Co., this new beauty is the most powerful towboat ever constructed for the Missouri River. It is named for the late Lachlan Macleay, a prominent river leader who headed the Missippi Valley Association for 33 years until his death in 1952. The recent christening of the craft was the pleasant task of Mrs. Donald Macleay, daughter-in-law of its namesake.

Designed specifically for the Big Muddy, it indicates the growing importance of the Missouri for diesel commercial traffic. Tonnage figures show an impressive increase each month. Last year's total came to approximately 288,000 tons—and is expected to be surpassed this year.

The quadruple-screw vessel is 162x45x10 ft. She has a normal draft of 5½ ft., adaptable for the Missouri River where shallow draft and high power are still required on the unfinished navigation channel.

Propulsion is provided by four General Motors (Cleveland) Model 12-567-A diesel engines. Each engine develops 900 hp at 750 rpm. Falk three-to-one reverse-reduction gears turn the four blade, 78-in. diameter steel alloy propellers at 250 rpm.

Two of the main engines and one generator engine are cooled by circulating the jacket water through St. Louis Ship closed skin cooling ducts. A Vapor Phase system, a highly developed means of removing waste heat from internal combustion engines, cools the remaining engines. The heated jacket water rises to a Vapor Phase unit where the steam



Lower engine room of the Federal Barge Line towboat, *Lachlan Macleay*, looking aft and showing two of the four Cleveland General Motors 12-567 main engines. Power is transmitted to the shafts through Falk 3-to-1 reverse-reduction gears.

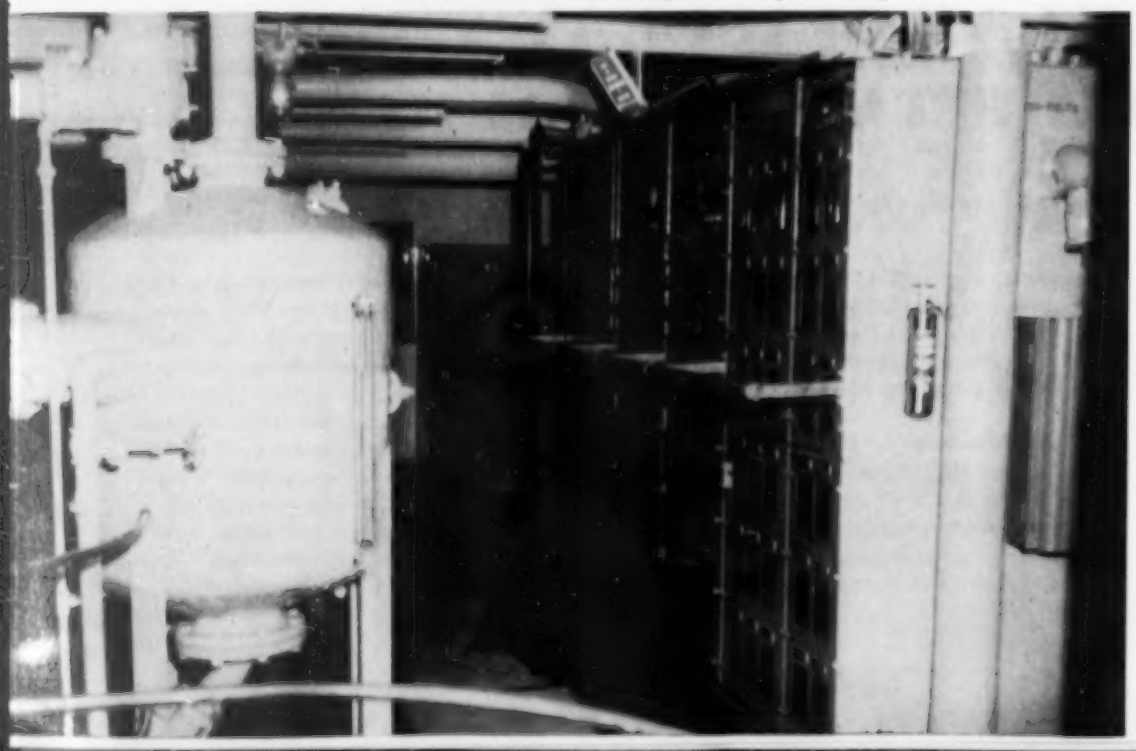
This view under the new towboat's stern shows propellers, steering rudders, and flanking rudders. The 4-blade propellers are 78 inches in diameter and turn at a speed of 250 rpm.

is separated from the water. The separated water flows back to the engine while the steam is led off in a raw water condenser. The condensate is pumped back into the water system. Temperature of jacket water remains at the boiling point of the coolant (212° if water is at sea level) under all conditions of load and surrounding temperature.

This continual high temperature eliminates condensation, oil sludge, and reduces wear as expansion and contraction of metal parts is greatly cut. This enables control of engine temperature without use of any mechanical or electrical device.

Two 100-kw, 440-volt ac generators, each driven by a GM Model 3-268-A diesel engine, furnish electric power for the boat. Two ¾-hp pumps provide for efficient transfer of fuel oil between bunkers. Two ½-hp fuel oil service pumps do the job from bunker tanks to day tanks. Two 23.5 cfm air compressors, driven by motors provide for main engine starting. Airflex clutches and air whistle.

Two of the main propulsion engines are cooled by Vapor Phase systems. One of these shows in the left foreground of the picture below. Also shown is the main switchboard. Exhaust silencers on the main engines are Burgess-Manning.



The steel hull is framed on the transverse and longitudinal system. It is characterized by a semi-molded bow and two propeller tunnels designed for a maximum flow of water to the four propellers, mounted two to each tunnel. Hull lines are also specially designed for the shallow Missouri River.

Bottom and side plating are ⅜-in. thick, the bilge and tunnel plating ½-in. thick, and all bulkheads ⅜-in. thick and stiffened both horizontally and vertically. The deck house is of welded steel construction with steel partitions at the forward and aft ends of the engine room. All weather-exposed surfaces are protected with two inches of insulation. The lining and partitions throughout are tempered Masonite.

In the main deck house, quarters for six deck hands in three rooms, two oilers in one room, and a cook and mess boy in one room are provided. The mess room seats eight. The galley is equipped with the most modern equipment available. The upper deck house provides quarters for two mates in one room, a chief and assistant engineer in another, separate rooms for the captain and pilot, and a guest room sleeping two. Access from the main deck to the upper deck and the pilothouse is by both inside and outside stairways.

While the outside appearance, the deckhouses, the messroom, lounges, galley and pilothouse all indicate the magnificence of this new boat, the en-

ropes, this new boat is furnished with another unique feature. Two additional single tow knees and a towing bitt astern forward of the rudders will enable this new craft to handle any sandbar. When she encounters a sandbar her barges won't clear, the boat can go to the front end of the tow, pull across the bar and float the barges over it with the wash from the propellers. She will also carry a kingpost derrick capable of lifting a total of 4000 pounds.

Friends of the Federal Barge Co. are happy over the acquisition of this new towboat. It rounds out an even dozen active diesel towboats for this company. The *Macleay's* inaugural trip was well publicized and she received a big welcome all along the river.

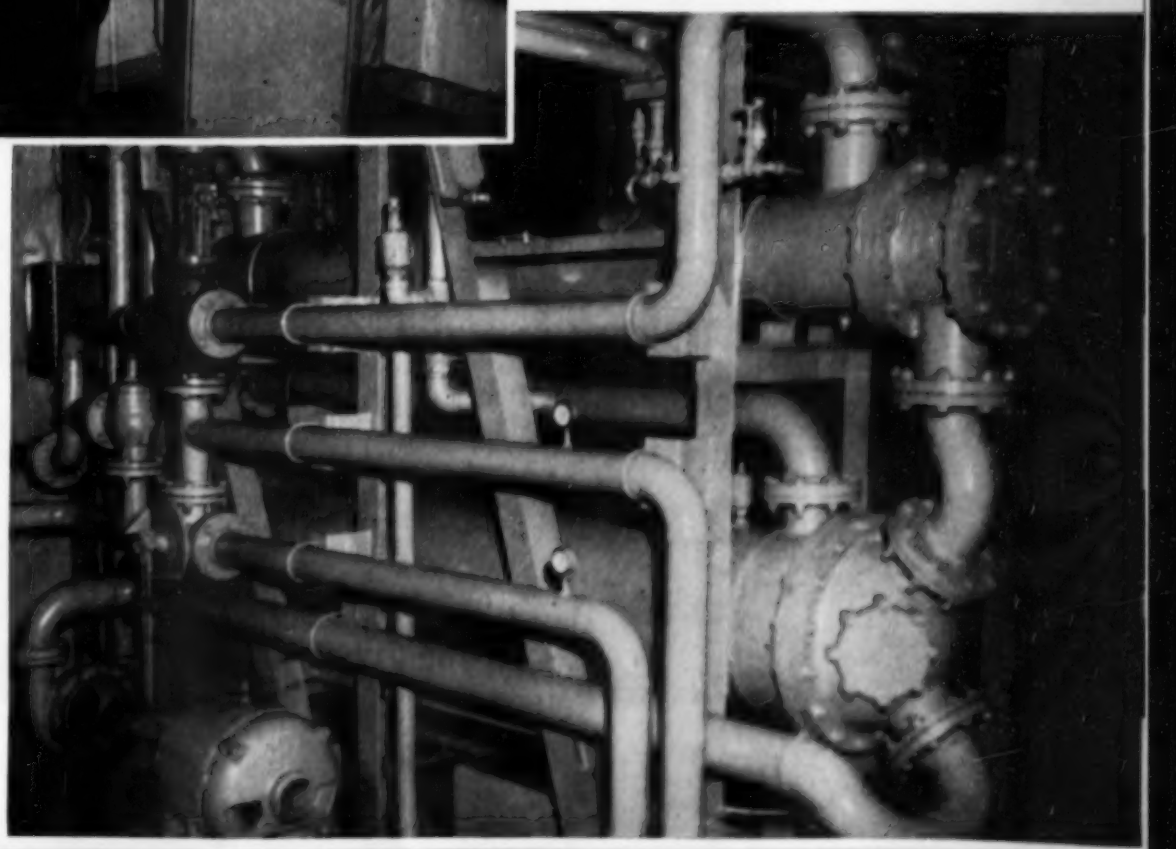
A reception for 500 people was given at Kansas City by hosts Herman T. Pott, chairman of the Federal Barge executive committee and president of St. Louis Shipbuilding and Steel Co.; Capt. A. C. Ingersoll, Jr., Federal Barge Line president; Capt. Donald L. Steele, general operating manager; Peter Fanchi, Jr., general traffic manager; John A. Welch, FBL's Kansas City representative; and W. E. Kemp, special counsel for Federal at Kansas City. At the Omaha, Nebraska reception, Governor Victor E. Anderson presented Captain Ingersoll with a commission in the "Nebraska" Navy.

Those who watched the week-by-week construction of this powerful beauty feel confident that every ton is made for the Missouri River. The prediction that the Missouri is destined to become the greatest grain highway in the world will come much closer to reality with this boat in operation. It brings the day closer to the late Mr. Macleay's conviction of justifying 12-month service on the Big Muddy. It is the boat designed for the new era in Missouri River barge traffic with a new design, new power, and new maneuverability for this new Master of Big Muddy–the *Lachlan Macleay*.

List of Equipment

Main engines–Four 900-hp General Motors (Cleveland) Model 12-567-A diesel engines.
Governors–Marquette.
Lube oil coolers–Graham.
Oil filters–Wartenbe.
Lube oil strainers–Purolator.
Auxiliary diesel-generator sets–powered by G-M Model 3-268-A diesels.
Generators (2) –Westinghouse.
Fire pump–Aurora.
Bilge pumps–Gould.
Clutches and air whistle–Airflex.
Air compressors–Quincy.
Auxiliaries controls–Cutler-Hammer.
Reduction gears–Falk.
Pilothouse air controls–Westinghouse Air Brake.
Reduction gear lube oil pumps (4) –Tuthill.
Exhaust silencers (4) –Burgess-Manning.

The console has the Westinghouse Air Brake engine controls, and the pilot house is equipped with an RCA radar, Sperry Gyro repeating compass, and Raytheon fathometer.



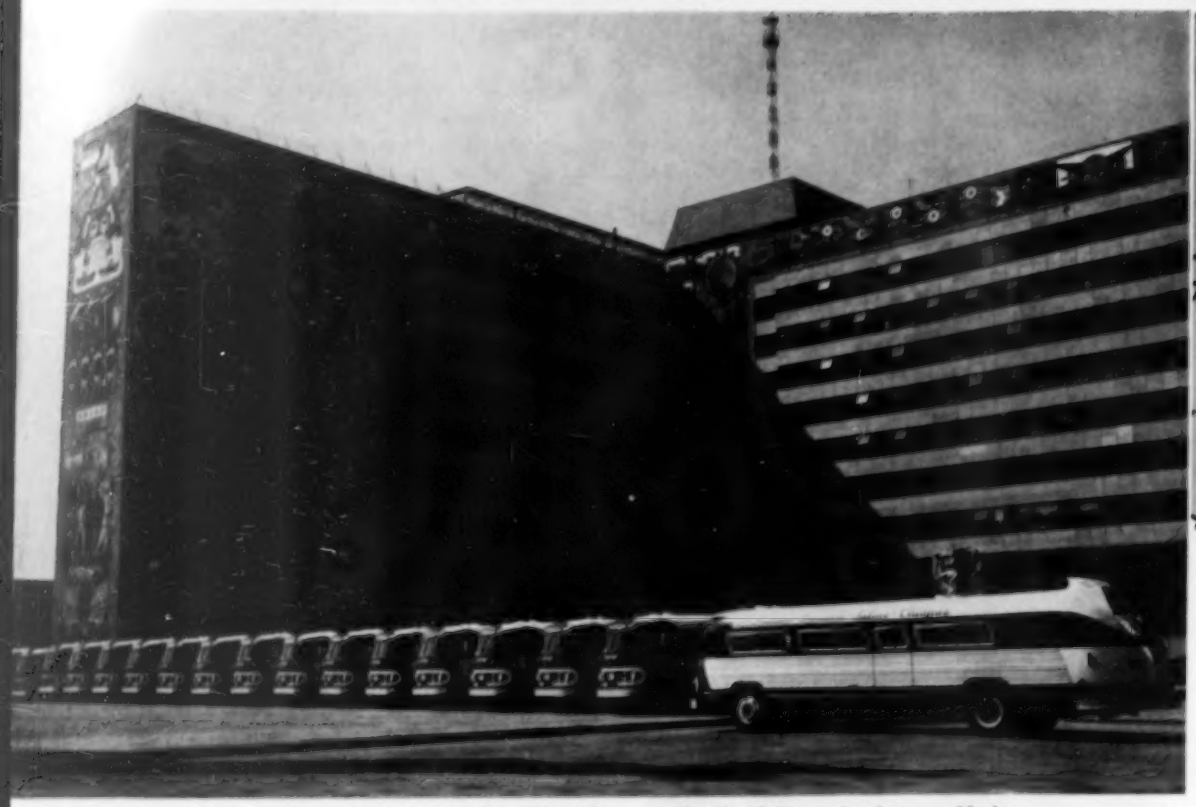
Auxiliary equipment includes the Graham lube oil cooler shown, Purolator lube oil strainers, Wartenbe oil filters, Cleveland Diesel generator sets, and Quincy air compressor.

gine room makes the deepest impression to the experienced river eye. It is well-lighted, well-ventilated and large enough for every practical purpose.

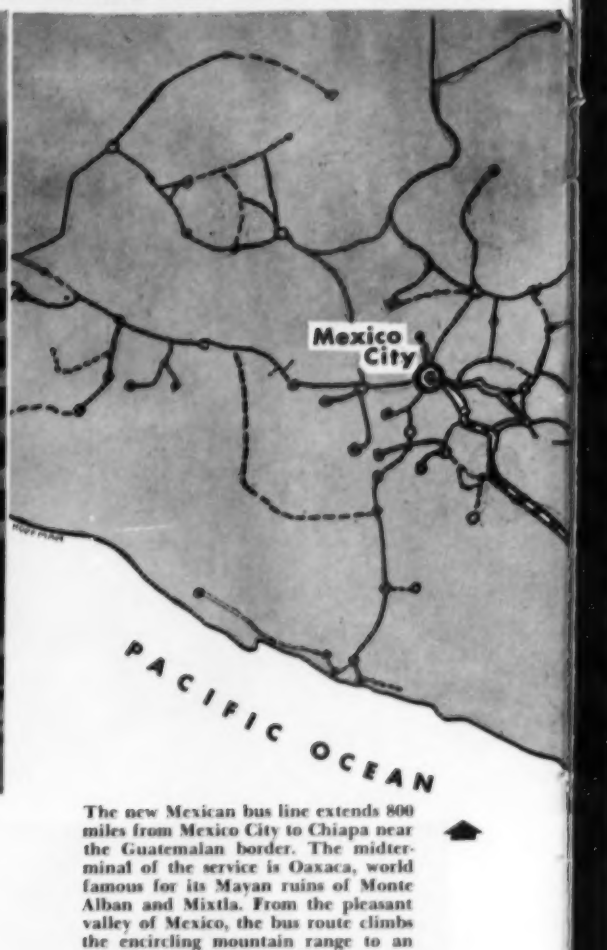
Two powerful steering systems of the St. Louis Ship mechanical hydraulic type are used. One system controls the four steering rudders. The other system controls the six flanking rudders. They are designed so the rudders can be turned from hard-over to hard-over in 15 sec. while towing.

For a vast change from the 19th century "cordelle" on the Missouri when sweating lines of men ashore pulled the old-time boats across sandbars with

CUMMINS-POWERED FLXIBLE BUSES



Seventeen of the new Flxible Visicoaches recently placed in service between Mexico City and the Guatemalan border are shown here, lined up in front of the beautiful new Communications Department building in Mexico City. The buses are powered by Model JBS-600 Cummins diesels delivering maximum brake horsepower of 150 @ 2500 rpm. The coaches carry 28 passengers and have reclining seats. Timken two-speed axles and Spicer five-speed transmissions are standard in the fleet. The batteries, alternators and starting motors are Delco-Remy.



The new Mexican bus line extends 800 miles from Mexico City to Chiapa near the Guatemalan border. The midterminal of the service is Oaxaca, world famous for its Mayan ruins of Monte Alban and Mixtla. From the pleasant valley of Mexico, the bus route climbs the encircling mountain range to an elevation of 10,000 ft. Then it drops rapidly to near sea level—into the muggy, tropical state of Chiapas. The picture below gives an indication of the tortuous nature of some of the terrain through which the buses operate daily

The new bus service is operated by Auto-Transportes del Sureste "Cristobal Colon" which flew drivers to the factory in Loudonville, Ohio, to pilot the fleet through to Mexico City. Then the owners sent ten buses on a good will inaugural trip to the Guatemalan border. The route goes through primitive country where the caravan was a sight never before seen by residents, many of them aboriginal Indians such as those shown in the picture below.

PROVIDE NEW DELUXE MEXICAN SERVICE

Because of the rapid changes in atmospheric pressure, temperature, load and road conditions, the Mexican bus route presents a supreme test for diesel engines. Starting in the moderate climate of Mexico City at 7400 ft., the buses soon climb to a cold elevation of 10,000 ft. They pass the beautiful, 17,887-ft.-high Popocatepetl and descend into the important city of Puebla. Farther on, they cross hot deserts and humid tropical jungles. At Juchitan, the route is down to near sea level. All these variations confront the diesels within 22 hours required for the 800-mile trip to Chiapa.

In the presence of bus line officials, drivers and their families, the new Fixible fleet was blessed in colorful ceremonies upon arrival in the company's yards in Mexico City. Obispo Jose Velalon applied holy water. A likeness of the Virgin Guadalupe, patron saint of the Republic of Mexico, appears on the standard. This ceremony, as well as attention showered on the fleet in other cities by church, business, military and government leaders, is indicative of the importance of the dieselized equipment to the whole nation.

Advent of the deluxe bus service was greeted with marked interest and respect by residents along the route. The farther south from cosmopolitan Mexico City one goes, the greater is the need for the reliable transportation service that diesel engines make possible. In each important city, the good will caravan was met by high state and municipal officials, and civic festivities marked the occasion. The photograph below shows a fair portion of the welcoming party in Juchitan and indicates that life can be interesting in the State of Chiapas.

PISTON RINGS AND ENGINE POWER

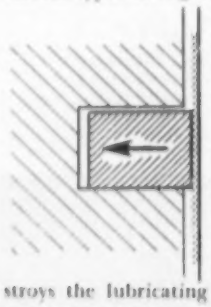
Keeping Piston Ring Faces To The Wall Is The First Step In Efficiently Converting Combustion Energy Into Useable Motion

By C. J. KREMER*

As we consider the past several years of internal combustion engine observation, we are impressed by a number of factors which seem in themselves to be elementary and yet they have assumed positions of primary concern. One, major among these, is the problem of keeping piston ring faces to the wall.

Generally, it is the ring face which contacts the cylinder, however, there are occasions when it is the side face of the ring which must bear on the groove land and this may then be considered as keeping side face to side wall. Piston rings are a first link in the conversion chain from combustion energy to useable motion and as we reach for higher output and greater efficiency it is increasingly evident that if perfect ring contacts could be maintained in internal combustion engines at all times and under all conditions a great many of the present day problems would cease to exist.

Let us investigate how this phenomenon affects various types of engines and their operation. Keeping the ring wearing face on the cylinder or liner is subject to a surprisingly wide range of disturbances. First, there is the matter of ring flutter, whereby the ring leaves the cylinder momentarily or for short periods of the stroke to allow blowby past its surface. This destroys the lubricating film both on the ring face and the cylinder wall. In addition it creates an excessive amount of residue in the form of carbon or varnish. Also, corrosive action is a possibility.

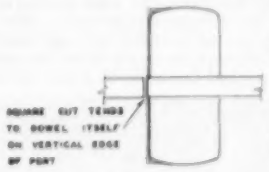


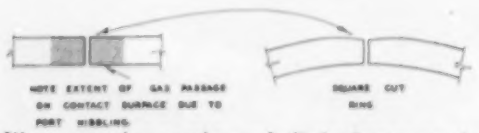
The erosion tendency of hot gases speeding through relatively small apertures must also be considered. This destroys the polished faces of rubbing surfaces which must be constantly renewed, each time at the expense of molecular particles. The loss of these constitutes wear. Excessive dirt created by the foregoing does not confine itself to the cylinder but finds its way also to the crankcase where it promotes accelerated wear on the bearings and all other moving parts. The use of lubricating oils with detergent additives is often inadequate because the extraneous material is being created faster than it can be carried away or in greater quantity than can be normally suspended by the detergent without excessive filtering.

This type of contact loss is due almost entirely to pressure entering between the ring face and the cylinder wall to force them apart before it has a chance to wire draw through the side clearance and actuate the ring outward toward the cylinder wall. It is not definitely known whether this break is once per piston cycle or, as seems more likely, a harmonica reed action amounting to many vibrations during the collapse period. Ring flutter results in breakage, usually at the heel or a point opposite the cut where vibrations concentrate.

Although 4-cycle engines are by no means exempt, as we shall see a little later, blowby due to ring flutter and blowby due to contaminated surfaces is more prevalent in 2-cycle engines. The reasons for this are several, having to do mostly with what happens in the port area. In this particular region the ring has drastically reduced wall bearings represented by the narrow port bridges.

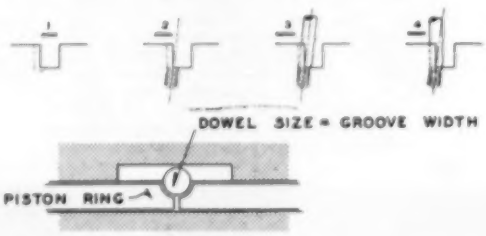
Normal contact surfaces are subject to hot gases and the bridges are difficult to lubricate for the same reason. A ring's natural tendency to rotate in its groove allows the ends to come into periodic alignment with the port opening or the edge of the port bridges. A persistent nibbling at the ring face near its cut results in destruction of its circularity so that when it is in firing position it no longer touches the wall at these points and there is a consequent wide gap for blowby and the promotion of ring flutter.





Wear, corrosion, erosion and all the factors previously mentioned are the immediate results. Attempts to retard the action by increased lubrication only accelerates the carbonizing and varnish contamination without particular benefit because the lubricant is blown away even to the extent in some cases of building up in the crankcase by reason of additional feed through the lubricators. If the ring ends remain or become "self-doweled" in the port area, severe wear or gouging of the bridges often results.

Several versions of piston ring design have been applied to this problem in an attempt to prevent bridge damage and ring clipping. These include such things as special tension patterns, "undercircularity" to minimize ring end pressure and special ring surface treatments, each with variations of from fair to no particular effectiveness. The development of satisfactory liners for 2-cycle cylinders permits a harder, more dense material structure which retards cylinder and port bridge damage. It does not, however, completely remove the hazard of ring snagging in the port area. Doweling of the rings is a natural cure assumption and at the present moment has shown the best results and offers the most promise, especially for unlined cylinders even though it is not always completely effective. Port marking or face contamination might still proceed at other sections of the ring and thus destroy circularity. The greatest objection to doweling has been the fear of dislodgement and the tendency of the rings to hammer against either or both sides with resulting ring, dowel and groove damage. Dislodgment has been effectively reduced by the method illustrated and is accomplished as follows:



1. Drill half hole upper side of groove. This is facilitated by wedging a ring segment in the groove so the drill cuts half piston land and half segment. Make sure drill does not walk in either direction. Hole in piston land must be a perfect half circle.

2. Drill and tap for dowel at a slight angle. This need not be greater than 5°. Depth of tap will be regulated by piston thickness at groove base. Thread depth should equal or be slightly greater than dowel diameter.

3. Screw dowel tightly into place.

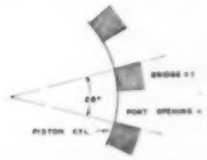
4. Bend dowel into position so that it fits notch snugly. This is done with the aid of a torch applying flame to base of dowel to stress relieve bend. Do not apply excessive heat which might damage piston or groove surface.

5. Cut dowel and file slightly below piston surface to prevent contact with cylinder. Dowel should not project into the groove greater than ½ so it will properly fit piston ring hole.

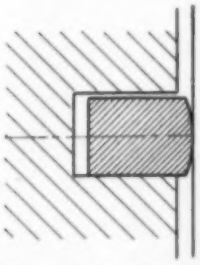
Agitation by the ring against the dowel is usually

*Chief Engineer, C. Lee Cook Company.

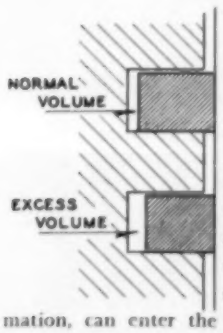
a direct result of some form of flutter and can be virtually eliminated by proper ring design which includes sufficient unit pressure and correct tension pattern. As to port contamination of a ring's circularity, we must consider the basic necessities of engine design. For instance, if it were left to the engine planner, he would prefer that the exhaust and intake port areas be as big as possible without port bridges. This is understandable because the problem at this point is one of easy exit for the exhaust and easy entrance for scavenging air. A piston ring designer, on the other hand, would prefer that the ports be small and the bridges be as large as possible. A give-and-take attitude from both sides is in order. We have a rule of thumb based on many years of operational results. This rule provides that the angle including port and bridge be not greater than half a radian, which is just a fancy way of saying approximately 28°.



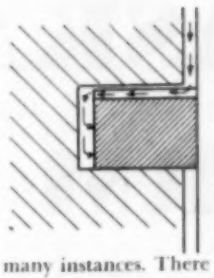
Within this confine, the dimension ratio should be 1 for the bridge to 1½ for the port. Naturally, this cannot always be achieved without directly affecting the engine characteristics. It is, however, as we say, a rule of thumb and engines having this approximation are known to have less ring damage either with or without dowels. If bridges are less than 30% as compared to port width, it is almost inevitable that destructive tendencies for both the rings and the cylinder will prevail. The area of a piston ring cross section also influences port hazard if it is less than the normal standards for its diameter, in which case there is lack of stability and undue flexing into the port.



There is still another reason for ring flutter which comes about due to the natural tendency of a piston ring to assume a convexed surface on its outer face. This is similar to the lead edge of surfaces being lapped and results from the ring passing through diametrical variations of the cylinder. Piston rocking also contributes. The amount of convexity on the ring face is obviously dependent upon the combined effectiveness of the factors mentioned.



This curvature even though it be relatively small results in a theoretical line contact with the cylinder wall at the ring face center. For this reason, 4-cycle operation is often subject to ring flutter because combustion gases, at the moment of sharp pressure rise during inflammation, can enter the forward wedge and force the ring off the wall before back actuation can occur. There are several ways to counteract this. Ring tension must be of sufficient force and correct pattern to resist the action. Clearances behind the ring must be reduced to practical minimums so that pressure balance time is effectively reduced.



In extreme cases, the top of the ring is provided with a series of notches or flutes which allow pressure entrance to the back before collapse can occur. This latter treatment has been the difference between success and failure in a great many instances. There were some initial objections such as carbon build up in the flutes and loss of tension due to the increased heat brought about by the additional surface exposure. Most or all of these have now been overcome by improved design and manufacturing techniques.

Ring flutter due to combustion shock is very often so obscure that its existence in a particular unit is highly controversial. Careful study and analysis is necessary in each case. Besides combustion ring flutter, there is another form which again is peculiar to 2-cycle work. Theoretically, there is no reason for the ring to leave its lower seat on the groove land. As the piston progresses upward during the compression stroke, the ring weight, the frictional drag on the cylinder wall and the compression pressure all tend to hold it on the bottom land. During combustion and the downward travel of the piston, the high pressure within the cylinder holds the ring on the down side. While the piston approaches the port area, cylinder pressure is diminishing to a point perhaps where the frictional drag at the ring face and residual pressure between rings might overcome the downward force. In this event, the ring could lift to the top side of its groove, in which case the rise would be gentle, amounting merely to a slight unbalance of forces.

When the piston proceeds into the port area, pressure within the cylinder exhausts rapidly and a counteracting upward force is the scavenging air amounting to at least several pounds per square inch. As the top of the piston clears the upper edge of intake ports, there is a surge of scavenging air. It is not yet possible to say exactly what this amounts to or how much opening is necessary to create it, but where the upper ring is still in the port area when it occurs, the ring is lifted rapidly to strike the groove land with considerable force. This is more severe if the ring has its ends in the intake area. The action on the ring is similar to that of a harmonica reed, and is known to take place in a number of 2-cycle units. In one case where the intake port area extended entirely around the cylinder, it was so severe that breakage resulted. Breakage, incidentally, occurred almost without fail at the ring heel or point directly opposite the cut. The result was very similar to breakage caused by combustion flutter. The solution was a reduction in side clearance which shortened the blow and minimized the vibration tone.

In another unit having doweled rings this side action began to appear, again on the intake side of the piston. The top ring was doweled at a port bridge directly in the center of the intake area. Excessive ring and groove wear near one or both ends resulted. From original considerations, positioning of the dowel at this point was good engineering because it kept the ring ends in the coolest portion of the port belt where there is better bridge lubrication. The lift action of the incrushing air, however, defeated this premise and it was necessary that the dowel be removed to the port bridge on either side of the cylinder which divided the intake and exhaust areas. By this means, a solid section of the ring was exposed to the lift and the concentration of blow formerly taking place at the end of the ring was effectively spread and correspondingly tamed. In the latter engine, reducing the groove clearance would have promoted sticking tendencies because of the different characteristics of this particular unit.

As previously mentioned, these things require careful study and experimentation and the ideal from a particular standpoint cannot always be achieved without sacrificing too much of some more important factor of engine design. It is the story evolution. Research and improvement continue apace. There are many things an operator can do to improve conditions. First and all important, he must assist the manufacturer by giving complete and reliable information regarding the problems encountered so that proper assemblies and ring types might be selected. It is perhaps possible that recently too much attention has been paid to piston ring oil control from the standpoint of stringency. Engines, especially of the angle type either with or without independent cylinder lubrication, have occasionally been starved for sufficient oil from the crankcase. In 4-cycle angle units trouble originates on the inboard half circle of the cylinder, although there might be ample and even excessive lubrication on the outboard half. In 2-cycle engines of the angle type even with independent oil feed the port bridges require some crankcase oil for proper lubrication. Oil control piston rings have the dual function of removing excesses together with metering and distributing the remaining film on the cylinder wall.

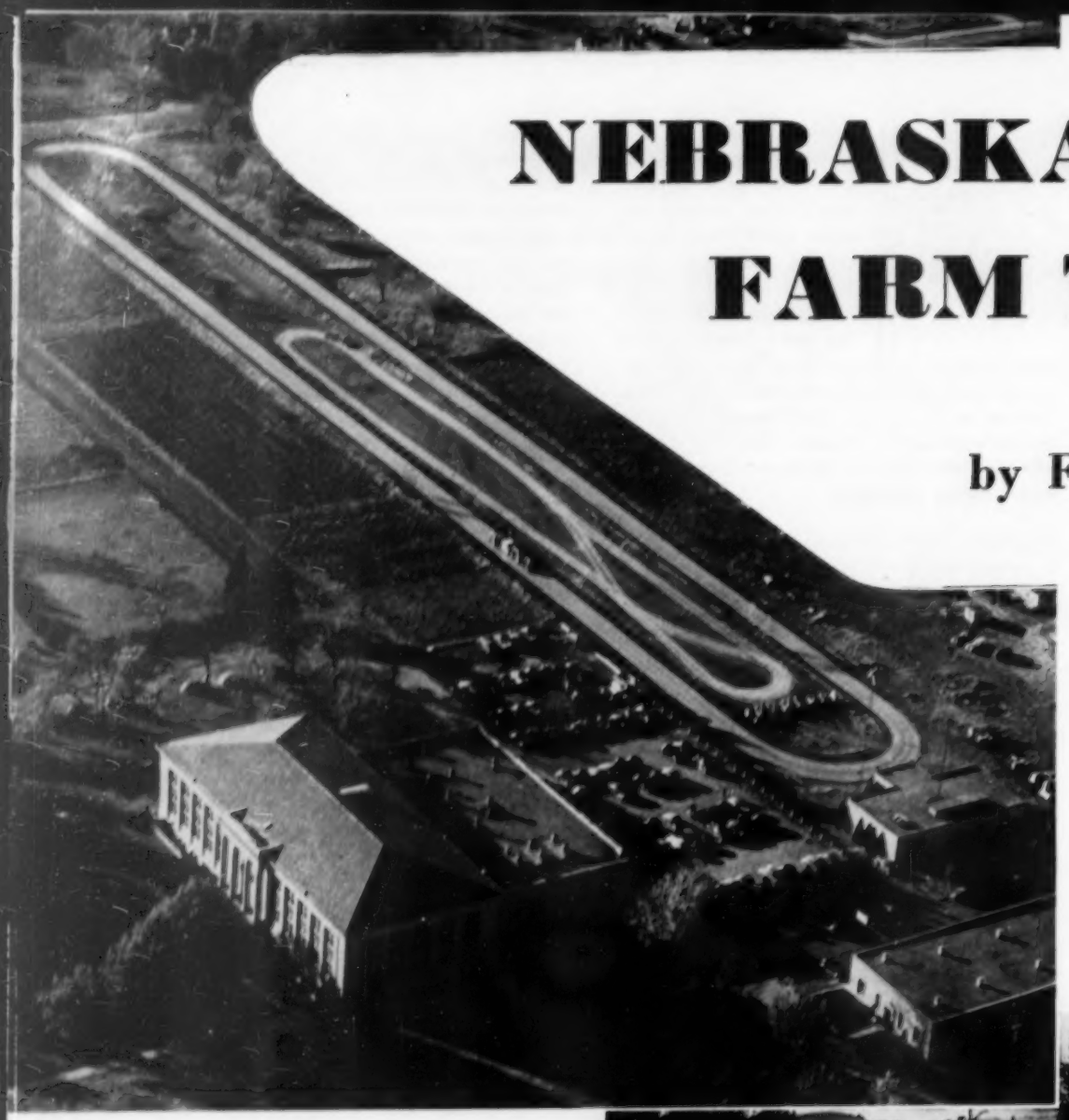
Rings as received must be carefully handled to preserve all of the characteristics built into them. They should not be stored on edge. Prolonged time in this position will affect true circularity.

Consideration should be given to cleanliness and the prevention of rust or other damage such as nicked surfaces or any form of permanent deformation. Corrosion often requires harsh cleaning methods which can affect surfaces and, obviously, nicks or dents can prevent contact, allowing detrimental forces to act. During installation the rings should be handled with extreme care so that they are not overstressed in any manner. Regular inspection and careful maintenance of all combustion and lubrication controls is a highly responsible function of the operating engineer.

It is the goal of both manufacturer and operator to obtain the highest sustained output at the lowest possible cost. To achieve this requires careful cooperation. We cannot cure a sore thumb by merely bandaging it. Treating symptoms is a blind approach to a point of diminishing return. We must seek underlying causes and apply permanent remedies. With piston rings let's keep faces to the wall —and keep them smiling.

NEBRASKA TESTS FARM TRACTORS

by F. Hal Higgins



The University of Nebraska tractor testing building and grounds, where all new models of tractors offered for sale to Nebraska farmers are tested. These tests have become world famous, and many nations have adapted the testing methods for their own use.

A total of 76 diesel tractors have appeared and passed tests set up by Nebraska's law in 1920. The first diesel tractor appeared for testing in 1932, according to Dr. C. W. Smith, head of the Board of Tractor Test Engineers. He has been in close touch with the testing work at University of Nebraska's Agricultural Engineering department since the testing was started 35 years ago.

The rated drawbar horsepower range for tractors tested as of Feb. 10, 1955 has been from 17.42 for a Buda-powered Farmaster to 120.80 for an International TD24. Two Petter engines from England rated 8.09 and 8.81 belt hp. The makes and number of models of diesel tractors that have gone through the Nebraska tests are as follows: 23 Caterpillar, 23 International, 13 Oliver (including Cletrac), 11 Allis-Chalmers, 2 Deere, 1 Case, 2 Massey-Harris, 2 Harris Mfg. Co., 2 Intercontinental, 1 Farmaster, 1 Global, 1 Cockshutt, 1 Someca and 1 Ford.

The reason for the Nebraska tests is interesting. Back in World War I days, hundreds of tractors were built without any regard to whether they would perform as advertised. The farmer was shifting from horse to gasoline power and knew little or nothing of gasoline engines and how to operate tractors. There was little or no dealer service for most of them. Many of the old full-line plow and gasoline engine manufacturers who had dealers in some areas had not yet learned how to build, test and service tractors. Fuels, carburetors, greases,

This pair from the same manufacturer, Deere and Company, line up side-by-side to show progress made from the time of the Number 1 Nebraska test to 1954. Prof. C. W. Smith is aboard the old tractor, and Test Engineer H. A. Lentper is on the new.

An International Harvester TD-9 crawler tractor being put through the paces. This model is one of IHC's big farm power leaders, and has been an outstanding performer for them.

cleaners, cooling systems, etc., were all in their infancy and still being developed on autos and trucks before getting to the tractor builders. There were no air tires.

Every tractor going onto soft farm lands had an up-hill climb over rough and soft traction, wasting much of its power before it could do work at the drawbar. It was this situation which made farmers see red when they bought tractors that would not perform as expected.

A Nebraska farmer bought one tractor named "Ford," which brings up the reason why Henry Ford named his tractor "Fordson" when it appeared. A pair of smart operators in Minneapolis knew Ford was planning to bring out a tractor. They hunted up a local lad with the same last name and rushed out their "Ford" tractor to cash in on the famous Model T name before Henry Ford was in the tractor market. The Nebraska farmer who "got stung" on this deal later ran for and was elected to the state legislature. He got even by writing a bill, which eventually was passed, protecting farmers from illegitimate tractor promoters. The law set up the Nebraska Test for all farm tractors to be sold in that state. The University of Nebraska Agricultural Engineering department was equipped and began testing under the new law in 1920. Ohio State University and Purdue University agricultural engineering departments had done a little testing for tractor shows in their states but they bowed out and the Nebraska Test became the official one that the industry endorsed.

The law as outlined in the Nebraska Tests . . . "was enacted to encourage the manufacture and sale of improved types of tractors and to contribute to a more successful use of the tractor for farming." The fact that there are more than 4,000,000 tractors on U. S. farms attests to the fact that the law has succeeded to a remarkable extent.

The tests, after a preliminary 12-hour break-in period, include a series of belt horsepower tests, then tests under varying loads and finally five drawbar horsepower tests. The final report shows the fuel, oil and time, gives the engine description and notes all repairs and adjustments which had to be made during the course of the tests.

Case, Caterpillar, Deere, International Harvester, Ford and Massey-Harris have all built the engines for their tractors. Oliver, which started with Hercules, also has developed its own diesel engine to power its crawler and its full line of wheel tractors. Its purchase of Cletrac at the end of World War II gave Oliver a line of diesel crawlers which are now under Oliver name and power. Buda powers the Farmaster, Cockshutt and Intercontinental tractors. GMC has had the call on all Allis-Chalmers diesel tractors up until last year. Through its acquisition of Buda, A-C is sure to send its 1955 tractors to the testing station with that power. Allis-Chalmers started with its diesels way back in 1928 when an Atlas-powered Monarch crawler was shown at the California State Fair and a piece of literature was sent out on it. It was built to meet the demand of California farmers, contractors and loggers for a diesel tractor three years before the Cat appeared. But Atlas reorganized and turned to the marine field, so development of this combination stopped.

Continental diesel engines appear in the Nebraska Test list on two tractors: the Huber-built Global, manufactured for the export trade, and one of the two Harris FDW-C models. The other Harris is powered by a GMC diesel.

These Nebraska tests vividly point out the farm trends to dieselized tractors. In 1953, less than 20% of the tractors tested were diesels; in 1954 this figure jumped to 50%, and there are ten new diesel models coming up for tests in 1955. All farm tractor builders are now offering diesel models in from two to five sizes.

A diesel wheel tractor from Deere's Waterloo, Iowa, Works taking its run at the testing grounds. It is pulling the vehicle containing the measuring and calculating equipment, plus two tractors to provide a load. Tractors are tested on long-time runs to determine rated horsepower at the drawbar, and also on short runs to determine the intermittent or maximum horsepower at the drawbar.

An Allis-Chalmers HD-15 tractor, powered by a GM diesel, gets a test with a long train dragging behind to act as a load. These Nebraska tests are considered as the standard reference for tractor performance throughout the nation.

A Caterpillar D2 diesel crawler tractor undergoing the belt horsepower determination test. The Nebraska test includes testing the belt horsepower as well as the drawbar pull.

Above is shown the control cabinet through which the diesel-electric set picks up the communications network load instantly in case of a local power failure. The Custom Built Control unit is on left edge of cabinet, below, and above it is the Asco trickle charger.

The 150-hp Waukesha diesel drives a Palmer generator with a top-mounted Continental exciter. The unit is mounted on Korfund Vibration dampeners.

A CIVIL DEFENSE INSTALLATION

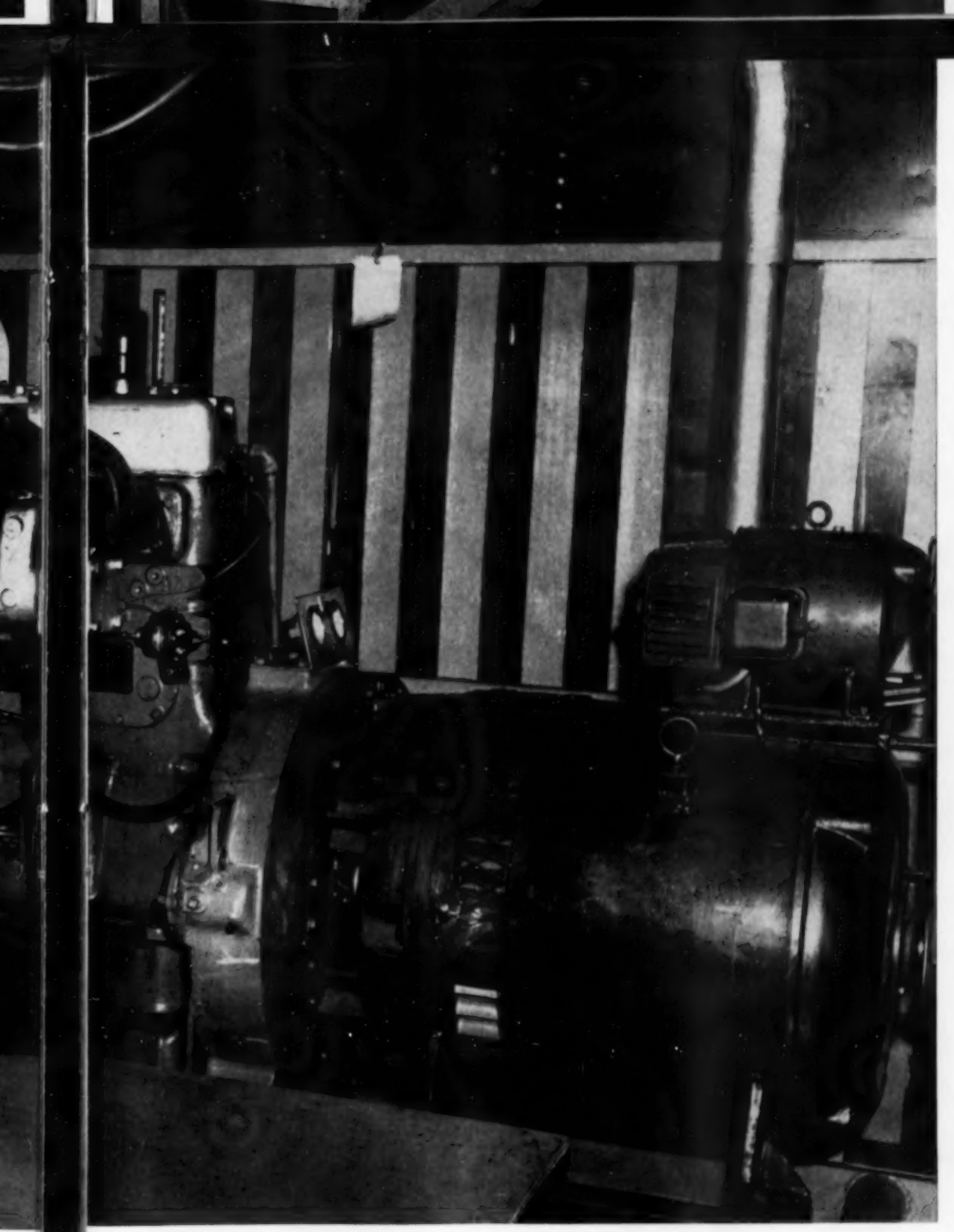
DIESEL INSURES POWER FOR SEATTLE-ALASKA CABLE

By CHAS. F. A. MANN

ONE of the world's unique communications systems is the far-flung Alaska radio and cable network that reaches north and west of Seattle. It connects the whole territory of Alaska with "the states", and, since U.S. military activities have grown in the Far East, the Orient, too, is included in the network.

The most interesting feature of the system to persons associated with the diesel industry is the fact that a fully-automatic diesel-electric installation safeguards the entire communications network. One Waukesha diesel, turning a Palmer generator, provides power in emergencies. Although the need for power may be great, and while the area covered is tremendous, the amount of power required for operation of the system is relatively light.

Originally started to give the typical small Alaska towns dependable telegraph service at a reasonable cost, the system grew by leaps and bounds. The effectiveness of the operation is shown by the fact that newspapers in Sitka, Ketchikan, Juneau, Cordova, Anchorage and Fairbanks receive, at a cost they can afford to pay, exactly the same telegraphic news service as the big West Coast dailies. Twenty-four hours a day, every day in the year, world news, commercial dispatches, ship-to-shore messages, and vital military and other governmental communications flash over the network.



on both sides as a safe-guard against contact with the cooling fan. The unit is anchored to the concrete floor through a set of Korfund Vibration dampeners.

The automatic, electric Custom Built Control unit provides an engine cranking setup, has full water temperature and low oil pressure gauges and cut-offs, with an Asco Automatic Line Switch that insures the diesel will take over the full load within six seconds in case of an emergency. The Automatic Switch Co. line switch is a heavy-duty 400-amp instrument that responds instantly to local power failures and recoveries.

A Palmer control panel is mounted away from the engine and carries the indicator gauges and manual control buttons. An Asco battery trickle charger is fitted on the control panel. Its function is to assure that the Model XF-41 Exide storage battery is automatically charged. The starting motor is a Delco heavy-duty diesel model, operating at 24 volts.

The engine jacket water and lubricating oil is kept at efficient operating temperatures, automatically, by a Kim Hotstart unit, coupled into the jacket water circuit. After the engine is shut down, the Hotstart heater cuts in through a thermostatic control, operating on regular 110 volt ac power.

Additional protection against the transmission of vibration is achieved through a Flexonics Rex-Weld Flexible Exhaust pipe unit, installed between the engine and the main outside duct. The latter leads to a Kittell residential-type muffler.

Equipment on the Waukesha includes a Donaldson air filter, Woodward hydraulic governor, Fram oil filter and American Bosch fuel injection system. A 600-gal. fuel tank has a street filling plug. For maximum safety, the plug is located a considerable distance from the generator set.

The emergency installation is so accurately controlled that engineers making the installation say that the diesel will pick up the load in case of necessity without the motors on the news teletype circuits even slowing down.

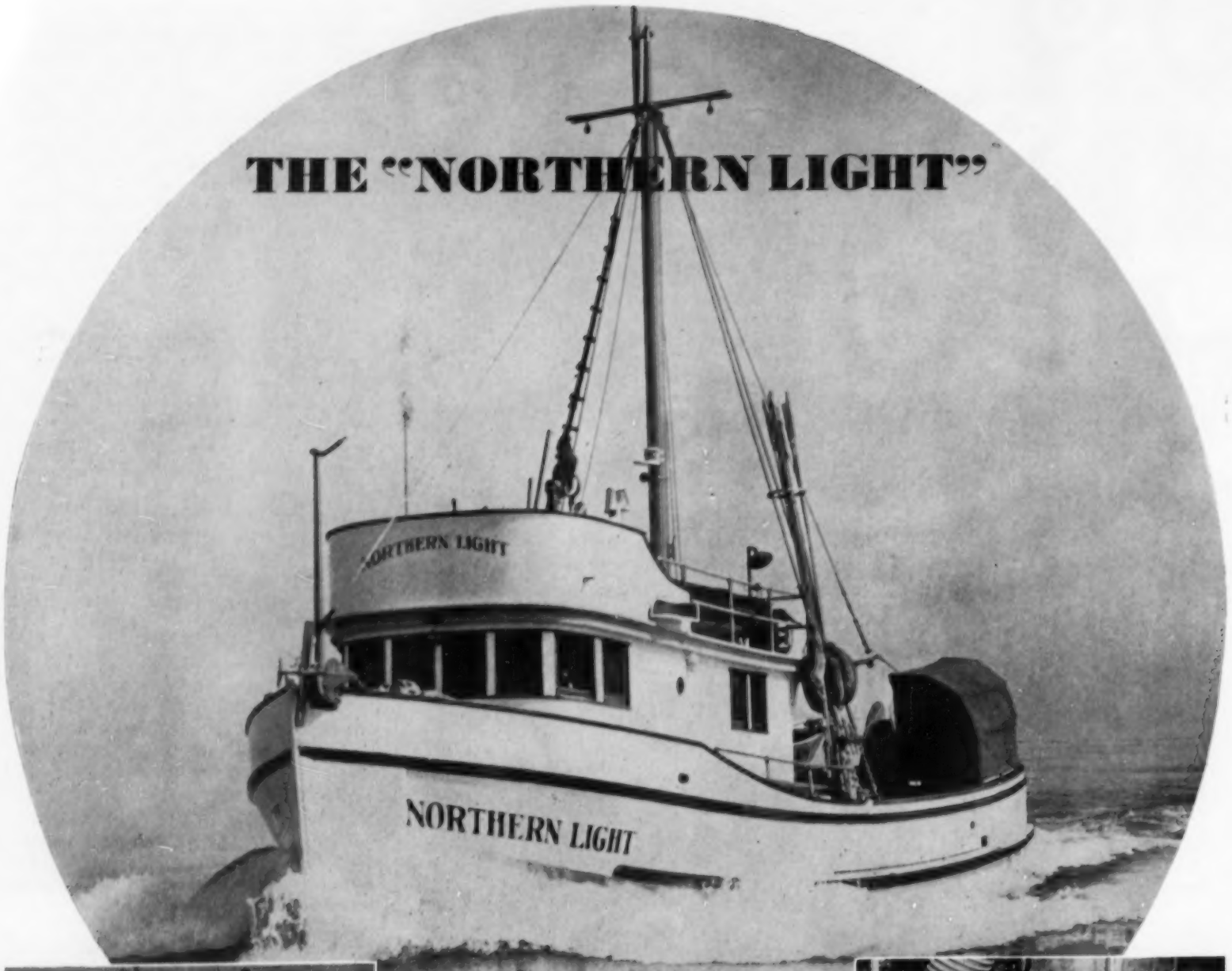
Central control of the system is in Seattle. To assure uninterrupted service, the U.S. Army Signal Corps recently installed the auxiliary power plant. It is a model of efficient, automatic control. A Custom Built Control unit provides for instant starting of the diesel-electric set, and for synchronizing it on the line, in case of a local power failure. Likewise, instant stoppage and cut-out occurs automatically when the primary power is restored.

The emergency unit was assembled and installed by the Star Machinery Co., Seattle, from basic plans prepared by the Seattle office of the Signal Corps. The prime mover is a 6-cylinder Model D-WAKD Waukesha diesel which delivers 150 hp at 1200 rpm. It drives a 120/208 volt ac Palmer generator, with a top-mounted Continental exciter, V-belt driven from a main shaft extension.

The unit is mounted on an integral steel frame and includes an automotive-type radiator, screened

The Waukesha engine is equipped with Donaldson air filters, a Fram oil filter, and American Bosch fuel injection system. For instant starting, jacket water and lube oil is kept at operating temperatures by a Kim Hotstart unit.

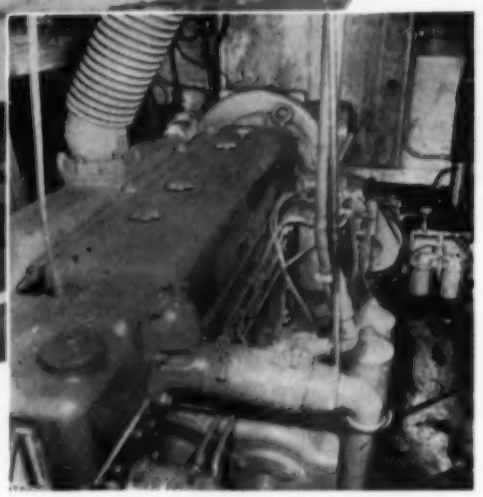
THE "NORTHERN LIGHT"



Jonas and Hans Hoddevik (left to right) of Seattle aboard the *Northern Light*. Recently repowered, she carried a 57,000-lb. payload and has top speed of 10 knots.

A NEW diesel recently installed aboard the *Northern Light*, a 55-ft. fisher operated in the Gulf of Alaska, has resulted in a 1500-lb. increase in payload capacity and an increase in speed which may mean an extra fishing trip per season. The boat is owned by Jonas and Hans Hoddevik of Seattle, Wash., who report that with the installation of a General Motors 6-110 diesel the engine compartment space required is substantially less than formerly and that the speed of the craft is increased almost three knots. Fuel tankage has been upped from 1500 gallons to 1900 gallons.

The craft is used for halibut fishing in the gulf between Kodiak and Cape Cleare. After the halibut season, the Hoddeviks use the *Northern Light* for tuna and as a beam trawler. Operating at 1600 rpm., the GM turns a 50-in. by 38-in. wheel through 3.7:1 reduction for a top vessel speed of 10 knots.



The 6-110 GM diesel engine which now powers the *Northern Light* fits into a small engine compartment and permits a payload increase of 1500 lbs.

The *Northern Light* is of wood construction and was built by Grandy Boat Co. of Seattle from designs by Edwin Monk. She has a beam of 15 ft., a draft of 7 ft. 6 in., and carries a total halibut payload of 57,000 lbs. She was repowered by Evans Engine & Equipment Co., Seattle.

IT is no secret that this country and Russia are locked in a deadly race for strategic superiority in the matter of guided missile warfare. Both have come a long way since the end of World War II, when Germany's rocket-propelled V-1 and V-2 buzz bombs fell into Allied hands, and both have spent billions of dollars with one goal in mind: the complete elimination of human crews from air combat.

Consider the stakes of such a race: whichever country achieves its goal first will be in a position to launch hundreds of pilotless bombers at the touch of a button, each bomber armed with an atomic warhead and each zeroed in on its target by a lone technician safely seated at a desk thousands of miles away. Traveling at super-sonic speeds for distances in excess of 5000 miles, these jet or rocket-propelled robots would defy detection by radar or interception by conventional aircraft. It is entirely conceivable that, with such superiority, one nation could bring the other to its knees and effectively obliterate its powers of retaliation within a matter of hours. These are the high stakes facing America today in its "battle of research" with Russia. What the final outcome will be depends ultimately on how well American science and industry can continue to solve the tactical problems presented by the military.

An example of a tactical problem solved by American science and industry in the past is the request made by the Army for a nuclear projectile that would have value in supporting front-line troops—its answer was the unique "atomic cannon." The Air Force approached the same group and said that it had an immediate need for a guided missile that could travel at near sonic speeds, carry a suitable warhead, be easily transported on wheels, and be accurately guided to its target by a small complement of men in the field; it got such a weapon recently in the jet-propelled B-61 Martin Matador, now in Europe with the 1st and 69th Pilotless Bomber Squadrons.

DIESELS IN THE GUIDED MISSILE PROGRAM

Three Fairbanks-Morse O-P Diesels Supply Dependable Power for Instruments Used In Guided Missile Tests At Air Force's Cape Canaveral, Fla., Center

In order to continue this flow of new, and often fantastic weapons to our armed forces, American science and industry must draw upon every resource available in this country, on its best minds, on its best industrial techniques, and on its best equipment. This is the story of three 960-hp Fairbanks-Morse opposed-piston diesel engines, how they were called upon to take part in this battle of research, and how they answered that call by supplying the stable power needed in an important phase of our guided missile program.

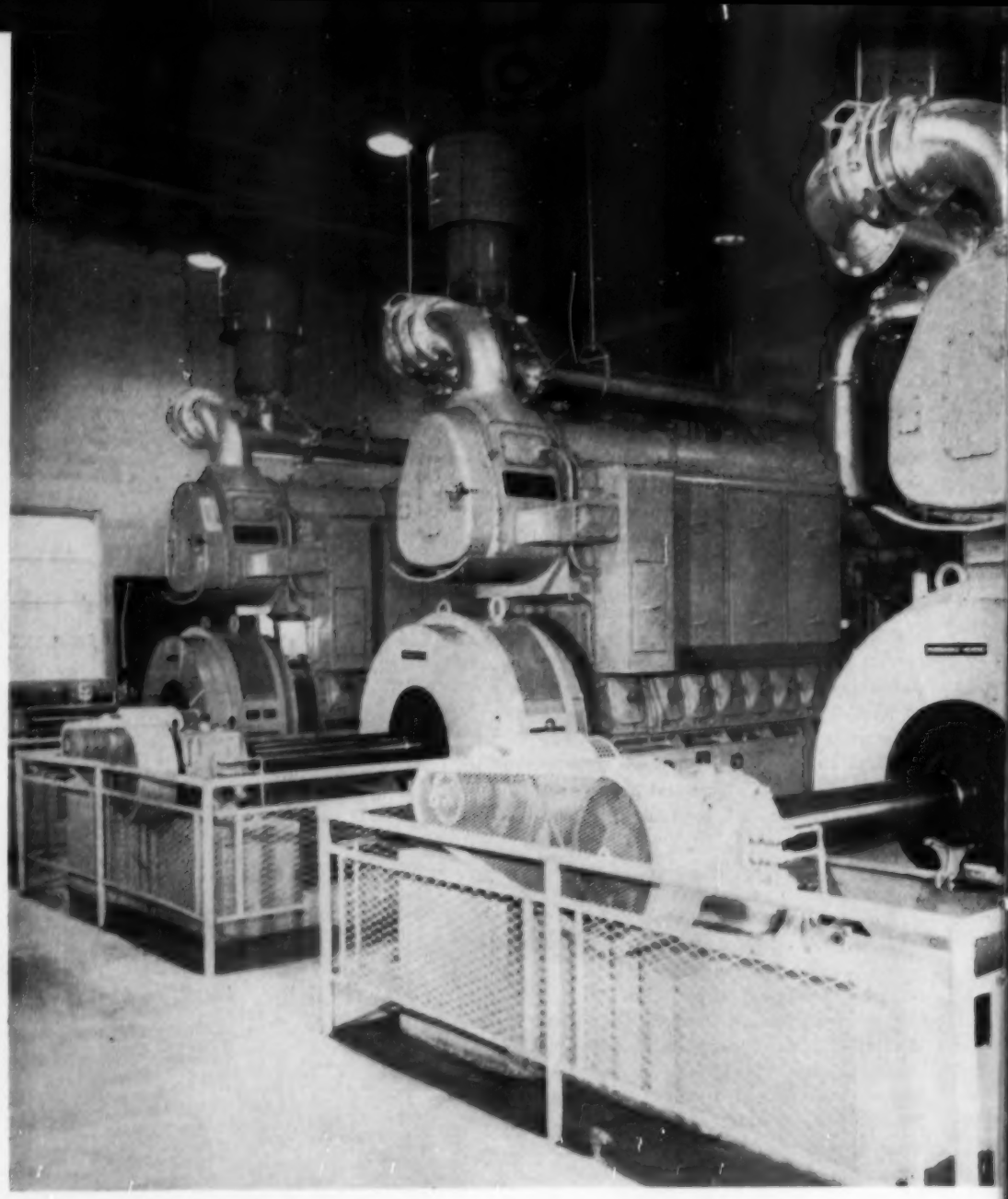
Virtually every guided missile developed in this country is brought to the top-secret Air Force Missile Test Center on Cape Canaveral, Fla., for final testing and experiment. Constructed far out among the sand dunes and palmetto bushes of Florida's east-central coast, this test center is one of the most tightly restricted bases in the country. No one goes in or out without special screening and without an escort, and no one at all, excepting a small group of top brass and classified personnel, is admitted to certain areas. As a result of this secrecy, little or nothing is known about the base or its operations. It was constructed following World War II, the first test taking place July 24, 1950, when a German-built V-2 rocket, carrying an American-built WAC Corporal missile in its nose, was launched. In addition to the launching site on Cape Canaveral, the testing facilities include Patrick Air Force Base, which is used to support technical, logistical and administrative functions at the center; seven instrumentation stations constructed on islands between the Florida mainland and Puerto Rico; and more than 1000 miles of open ocean. Together, these facilities constitute the longest proving range for guided missiles and pilotless aircraft.

In brief, this is the sequence of operations that

takes place during a normal guided missile "shoot" or test. When a private contractor, usually one of the nation's leading aircraft manufacturers, has an experimental guided missile that is ready for actual inflight testing, he notifies the Air Force which notifies the missile test center. The contractor then brings his weapon, under wraps, to the center. All agencies which might have air or surface vessels in the danger areas are alerted. The fabulously complex and sensitive instruments, used to track the experimental missile in flight and to record vital performance statistics, are readied for operation. As the specified launching time approaches, search planes leave the ground, and, together with radar, sweep the area for stray ships and aircraft.

At this point, approximately 12 hours have elapsed since the initial warning was transmitted. When everything is in readiness, with the experimental missile on its inclined launching platform, a RATO unit (rocket-assisted takeoff) is attached to the weapon's underbelly, and the jet engine in the missile itself is turned over electrically. While the starting motor is still whirring, the personnel who have not yet taken cover scramble into concrete blockhouses at the launching site. The electric cables to the missile are yanked free and someone in the blockhouse pushes a button. There is a teeth-chattering blast from the RATO unit as the missile tears itself loose from the ground. Rising from the launching platform on the end of a bolt of flame and smoke, the missile picks up momentum and streaks across the sky out of sight.

It never truly gets out of sight of the instruments, of course. From the instant it blasts its way loose from the ground, the experimental missile is in complete control from a desk at the center. Radar cameras and cine-theodolite instruments track its flight from one station to the other, making a permanent record of its trajectory, direction and other flight characteristics on film. Tracking radars automatically trace this information on plotting boards back at the center. Another weird looking instrument, known as a Mark 51 Telemetry Director,



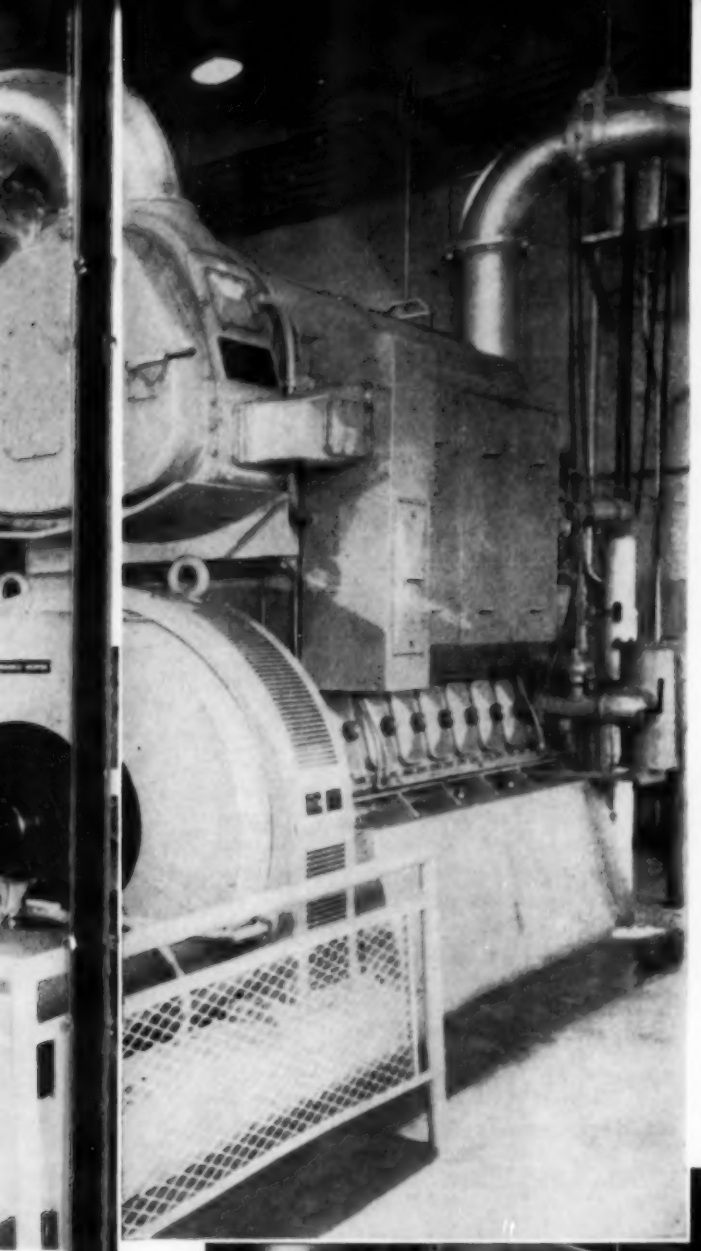
Each of these Fairbanks-Morse diesels, rated 960 hp at 720 rpm, drives a 500-kw alternator, used for standby purposes. At extreme right is seen one of the Air-Maze lube strainers, and above, the inside American air filters.

Check stations on islands record vital information about guided missiles and pilotless aircraft as they traverse the 1000-mile test range extending from Cape Canaveral, Florida, to Puerto Rico. Under electronic control at all times, the missile is "impacted" into the sea whenever desired.

receives automatically-transmitted radio impulses from the missile itself, transferring such vital information as speed, altitude and internal and external pressures and temperatures to magnetic tape, where it will be played back at the completion of the test for further study and analysis. While all of this data is being collected, an in-flight safety officer back at the center stands by, ready to destroy the missile at the touch of a button if it should deviate from its course or present a source of danger to anything or anybody in its path.

This, and similar operations, go on week after week at the Air Force Missile Test Center. The Air Force, through its Air Research and Development Command, is working in close cooperation with industrialists, physicists, chemists and engineers throughout the 48 states in a united effort to keep America ahead in the world race for technological supremacy. The B-61 Matador, powered with an Allison J-33 turbojet engine, is one of the few advanced weapons we know about; the others are shrouded in secrecy.

As important as this program of research is, however, it is not immune to such everyday problems as power supply. Power breeds power, and Amer-

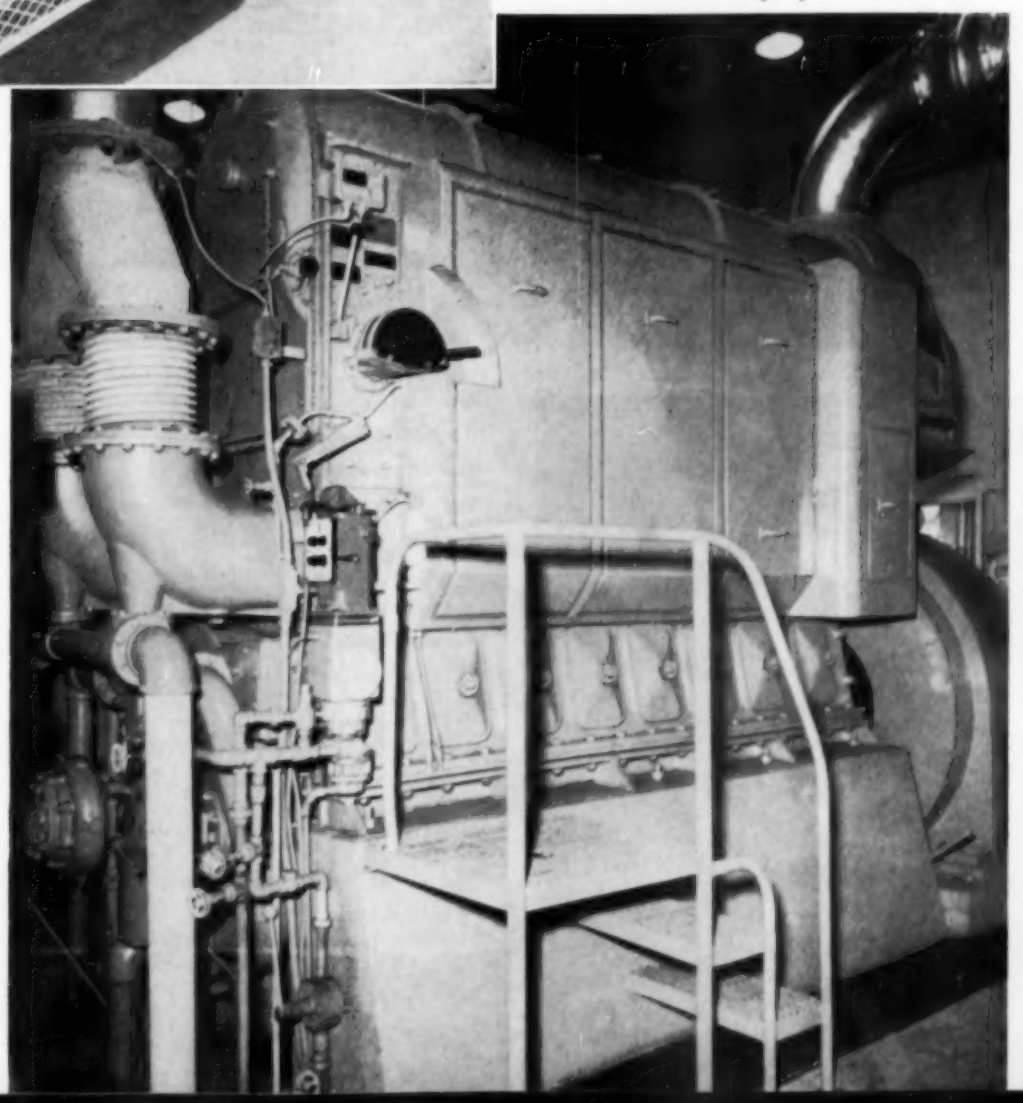


ica's guided missile program rests as surely on an adequate source of electric power as a modern jet depends upon an electric starter to turn its turbine over. The power supply problem at the Cape Canaveral center developed when the Air Force deliberately chose an isolated section of beach along Florida's east coast as a location for its missile test center. While the site was ideally remote for security reasons, it was sufficiently removed from the nearest utility generating station to create a serious voltage and frequency problem.

A station at Sanford, 75 miles north, serves a major portion of central Florida and lists among its customers a wide range of industrial, big and small business, tourist, residential, and seasonal vacationist accounts. Air conditioning is a major item in this section of the country, as are drainage and irrigation pumps. The result is a widely fluctuating load at the station and significant variations in voltage and frequency at distant points. When power arrives at the Cocoa station, about 14 miles west of the test center, it is stepped down from 66,000 to 33,000 volts. It is then sent about seven miles to the Cocoa Beach substation, where it is further reduced to 13,200 volts before reaching the South Gate entrance to the center.

Air Force officials found this power suitably stable for normal, everyday operations at the base, despite the voltage and frequency aberrations. But they also learned that this power was not nearly stable enough for the super-sensitive tracking instruments used in guided missile experiments. Most of these high-precision instruments are housed in the central building, where year-round air-conditioning protects them from the effects of temperature and humidity changes. Voltage and frequency deviations of more than one-tenth of one percent, however, were found to play greater havoc with the accuracy of this apparatus than the weather. After a short period of operation under purchased power, therefore, it was decided to construct the base's own power plant, to be used as standby in the event of an emergency and to supply power of constant voltage and frequency during all test periods.

A rear view of one of the three opposed-piston diesels, showing the Woodward governor. The engines are equipped with Nugent fuel oil filters, Roper lube pumps, and Viking transfer pumps.



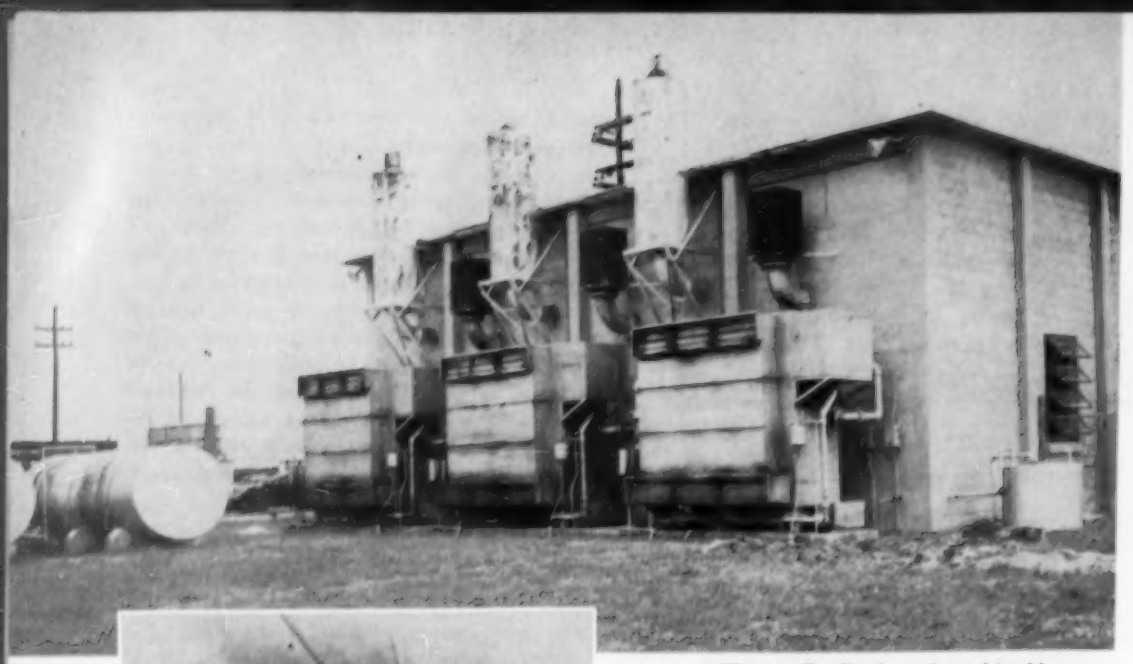
It was at this point that the three 960-hp diesel engines were called upon to play an important role in the Air Force's guided missile program. The units were Fairbanks-Morse, Model 38D8-⅛, 6-cylinder, opposed-piston diesels. Turning at 720 rpm, each drives a 625-kva, 500-kw, 3-phase, 60-cycle alternator with V-belted 7½-kw direct-current exciter. These engines were given the awesome responsibility of supplying highly stable power to all radar, telemetry, radio-control and cine-theodolite apparatus during test periods, and at the same time to protect the base against outside power failure.

In addition, the engines would carry the center's full load whenever they were placed on the line, including all water and sewage facilities, drainage pumps, air conditioners, telephones, and other utilities. They would also be used to power an 800-mile undersea communications cable which links the test center with each of the seven island instrumentation stations and permits maximum coordination.

In the future this cable will be extended to a distance of about 1500 miles, making it the longest cable of its kind in existence. Since the new standby plant went into service on June 2, 1955, its peak load has been 1350 kw.

Other plans call for the construction of a separate distribution system to serve the sensitive electronic instruments exclusively, thereby permitting purchased power to be used for non-critical utilities throughout each test period. This would free the three diesels to serve only the test instruments and would provide adequate reserve generating capacity for future expansion. Once the three new engines were placed on the line and the accuracy of the tracking apparatus assured, a rigid preventive maintenance and service schedule was instituted to make certain that the present high level of performance and efficiency would continue in the future.

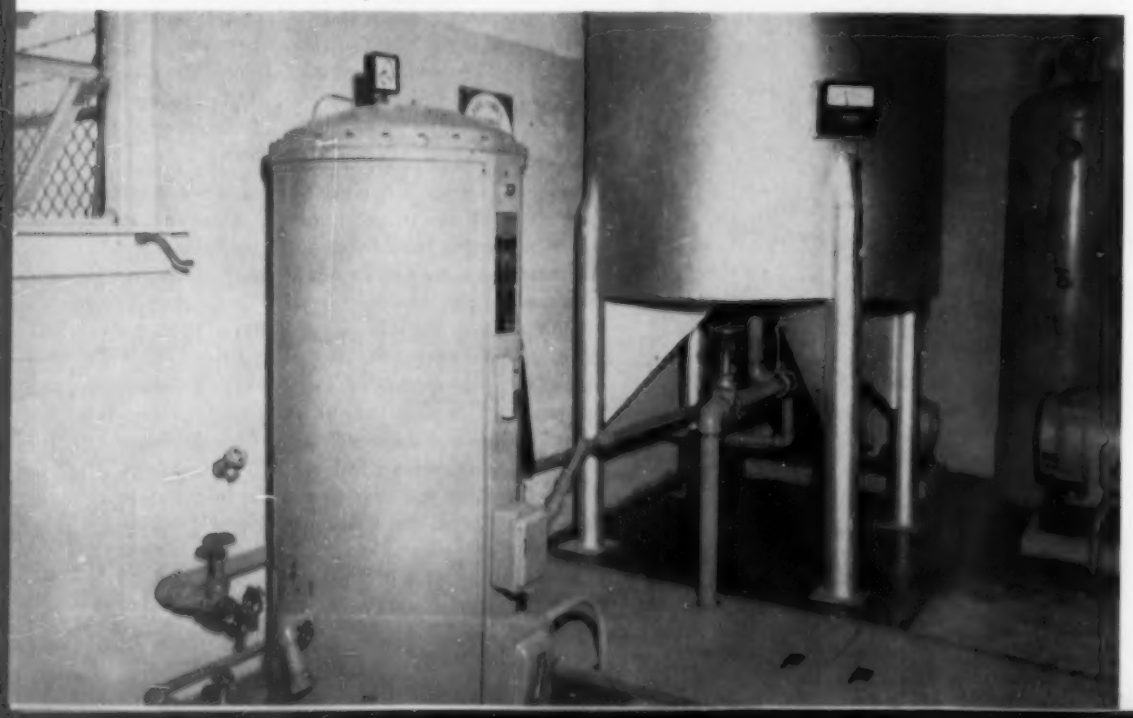
The engines and all auxiliaries are run for short periods every day in order to keep them in top operating shape. In addition, the main engines are inspected on a regular weekly, monthly, quarterly, semi-annual and annual basis, the annual inspection including removal of all pistons, bearings, rings and other key parts. Due to the damp climate peculiar to this region of the country, the three generator shafts have been blued to prevent overnight rusting and the slip rings on each alternator are checked thoroughly each week. The fuel injection systems are inspected at the end of every 100 hours, 250 hours and 500 hours of operation, de-



The standby diesels are housed in this building. Shown are the Fairbanks-Morse evaporative coolers, the American Cycoil air intake filters, and one of the two 5000-gal. fuel oil storage tanks.

This telemetry director, or antenna, follows the missile in flight and picks up radio messages which are automatically transcribed—pertaining to speed, altitude, pressure and temperature.

Lube oil is removed periodically from each engine sump and is stored in this 500-gal. tank. When the tank is filled, the lube is pumped through the Honan-Crane purifier shown.



spite the engine manufacturer's recommendation a single 750-hour inspection should be sufficient for most installations. Jacket water is analyzed at the end of each run for evidences of corrosion. A weekly check is made on each starting air system. The three governors are checked monthly. All batteries are checked daily.

By following this painstaking routine, W. T. Denyer, the plant superintendent, is able to keep his plant in the best possible operating condition, despite its standby status. This has paid off not only in faultless dependability but in increased engine efficiency and economy. Up to December 1, 1954, the three Fairbanks-Morse units had produced a total of over 664,000 kw/hrs at an average fuel consumption, according to tests conducted at the plant, of only .380 lbs. per hp/hr.

When the engines are on the line, lube is circulated under pressure through each unit by a built-in, engine-driven circulating pump. For increased protection, the oil is double filtered, first through a full-flow strainer on the pressure side of each pump and secondly through a four-cartridge, cellulose-packed by-pass filter. In addition, the oil sumps in each engine are drained periodically to a 500-gal. tank and pumped through a waste-packed reclaimer. Cooling is handled by individual evaporative coolers located outdoors at the rear of the plant. These coolers are equipped with automatic theromostatic controls which open and close the dampers located in the base of each unit, thus keeping the lube at the correct operating temperature at all times.

These same coolers are used to cool the jacket water which is circulated in a closed system by an engine-driven centrifugal pump. When the engines are shut-down, provision has been made for after-cooling by installing individual motor-driven pumps which circulate jacket water from each engine through the coolers. The amount of raw water in the sump of each cooler is regulated by an automatic float-controlled valve.

Double scavenging air filters are provided for each engine, one inside the plant and one outside. In the summer months, when it is desirable to keep the plant as cool as possible, the inside filters are used; in the winter, when the opposite is true and all efforts are bent towards keeping the plant as warm as possible, the outside filters are used. Starting air is supplied at a pressure of 250 lbs. by a single two-stage air compressor, equipped with alternate drives. A double set of V-belts permits this compressor to be driven either by a gasoline engine or an electric motor.

This, then, is the story of how diesel power is being used effectively in America's top-priority guided missile program. Though the engines involved carry a heavy responsibility, they have more than demonstrated their ability to do the job assigned with maximum efficiency and dependability. As examples of American equipment called upon to play an important role in the security of our country, they have demonstrated their ability to meet the exacting requirements of this unique service.

List of Equipment

Main engines—Fairbanks-Morse Model 38D8-⅛, 2-cycle, 6-cylinder, 8-⅛x10-in. opposed-piston diesels, rated 960 hp at 720 rpm.

Alternators and exciters—Fairbanks-Morse.

Governors—Woodward.

Fuel oil priming pump—Deming.

Fuel oil filters—Nugent.

Lube oil transfer pump—Viking.

Before and after lube pump—Roper.

Bypass lube oil filters—Fairbanks-Morse.

Full-flow lube strainers—Air-Maze.

Lube oil reclaimer—Honan-Crane.

Air intake filters—American Air Filter.

Air compressor, auxiliary generator, and gauge boards—Fairbanks-Morse.

Gauges—Marshalltown.

Exhaust pyrometers—Alnor.

Switchboard and switchboard meters and gauges—Westinghouse.

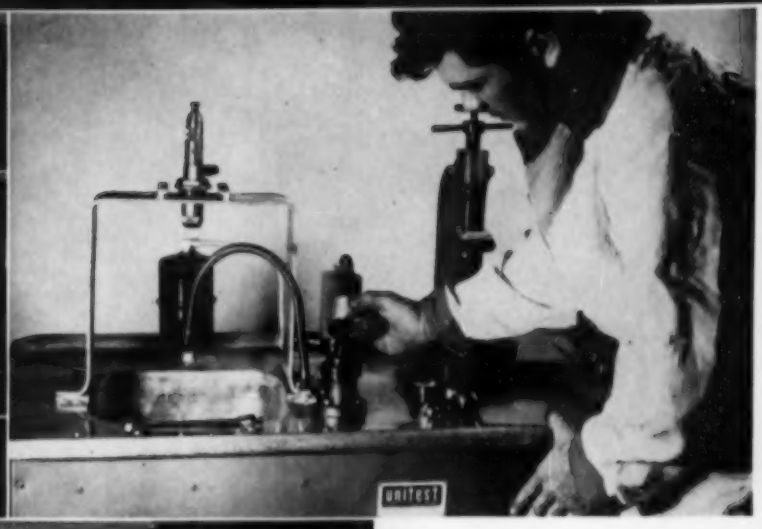


Photo shows a Caterpillar injector being put into holding fixture; the Bosch final-stage fuel filter through which all testing fuel is passed; the flexible hose for washing injector parts; and the nozzle washer beneath the aluminum cap which provides a positive means of pressure-washing nozzle tips.

A Cummins injector is being installed in fixture, with the hand-operated pump and pressure gauge behind the mechanic's arm. A Cat injector is located in holding arbor, ready for testing when piped to pump.

Here the mechanic is placing the spray cap over nozzle washer and the nozzle tip in position over the fuel pressure line. When the cap is depressed on a sliding valve, fuel is forced through the nozzle orifices as a final cleaning operation before installation of the nozzle body.

NEW EQUIPMENT FOR INJECTOR REPAIR SHOPS

SEVERAL new pieces of equipment for use in shops doing injector work have been developed recently by Diesel Control Corp., Wilmington, Calif. These units have won rapid and widespread acceptance. One machine is a Unitest Injector Test and Wash Stand. A companion setup is a Unitest Fuel Pump Calibrating Test Stand. The third is a rotary lapping machine, called a Spiralap.

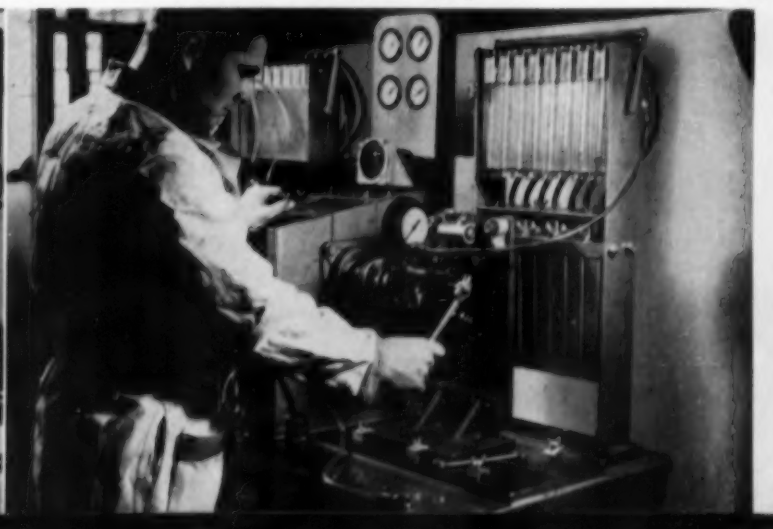
Fuel injectors built by Bendix, Bosch, Caterpillar, Cummins and Demco can be cleaned and tested on the first named Unitest equipment. It has been found particularly valuable in fleet overhaul and maintenance shops because of its versatility and the ease with which all types of medium high-speed engine injectors can be tested. Five adapter plates accomodate different makes of injectors, and a fixture is provided for Cummins injectors. These are designed to make quick change-overs possible. All components are mounted so the bench top can be lifted to service unit's motor.

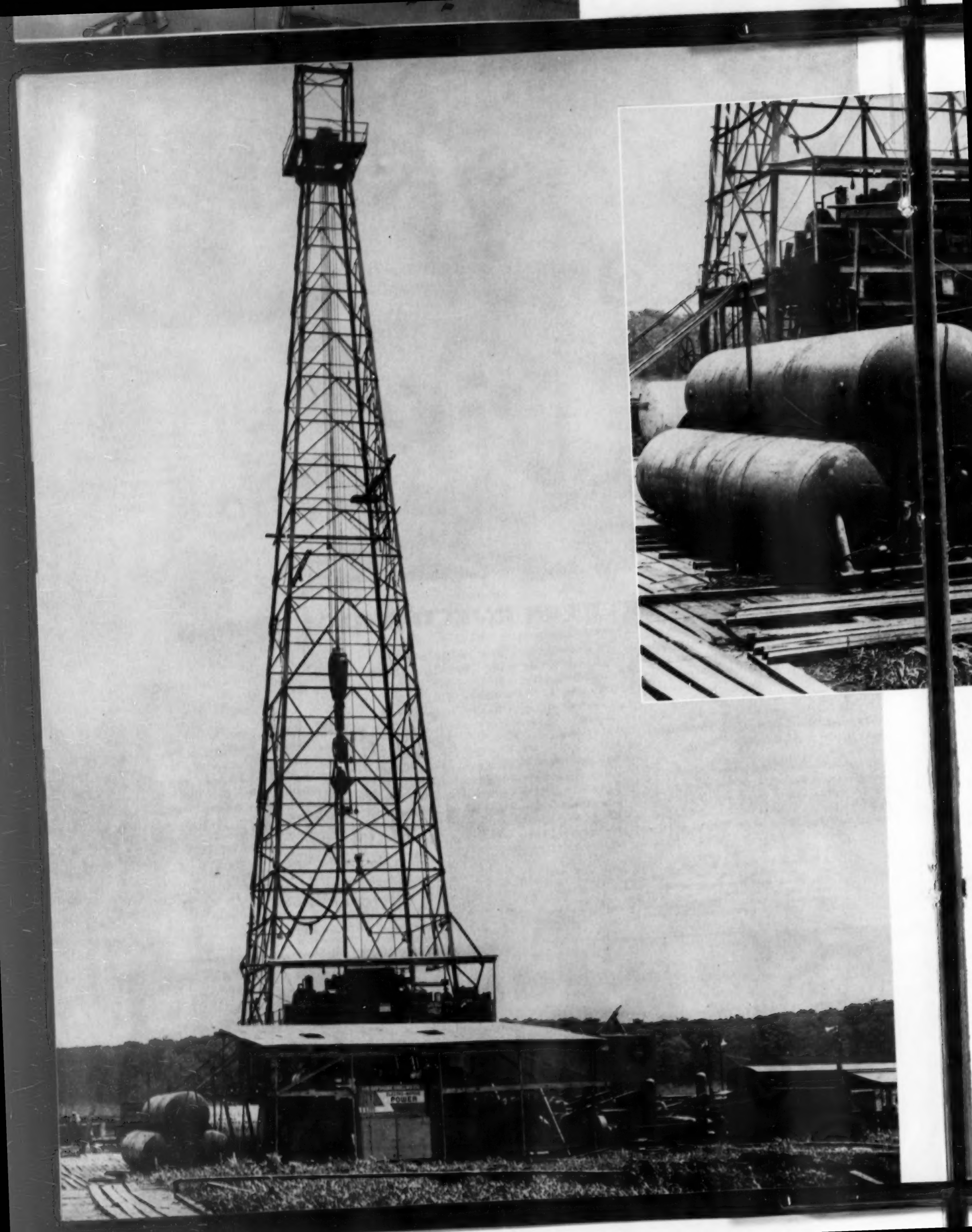
The Unitest Fuel Pump Calibrating Test Stand was developed for the American Bosch Corp. It is distributed by this organization and units have been placed in service all over the world. However, this machine can be easily adapted to calibrate other pumps. Fixtures have been designed to accommodate all three models of Cummins pumps, and those made by Caterpillar, International, General Motors and others.

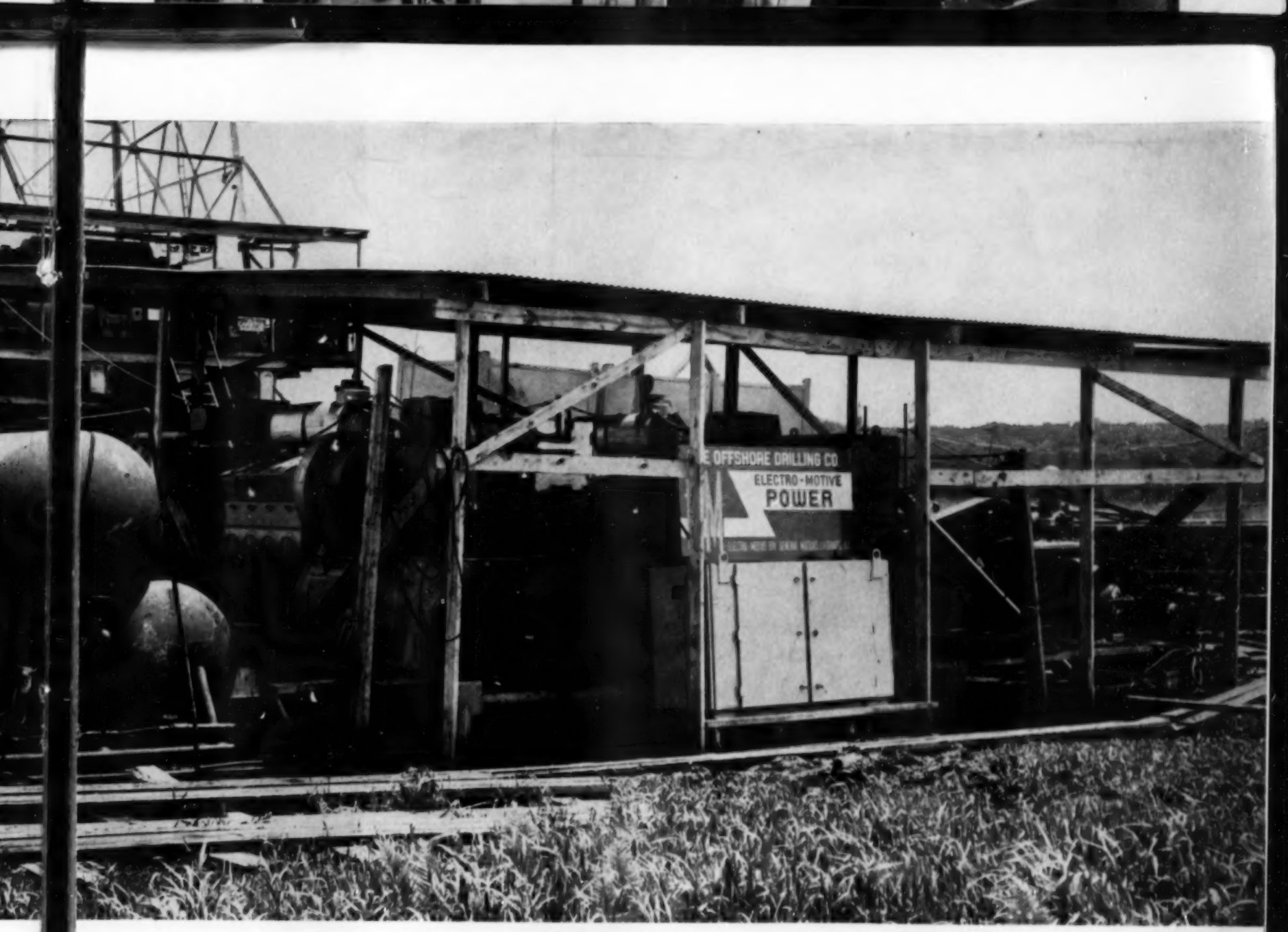
The Spiralap is a rotary flat lapping machine, designed to give the operator flexibility toward semi automatic lapping of flat surfaces. Three working plates are provided, and experience of the manufacturer on diesel injector repair work led to the use of optical flats. It is claimed that use of the machine will produce "positive flatness and accuracy to 0.000001 of an inch." Literature on all three units can be obtained from Diesel Control Corp., P. O. Box 596, Wilmington, Calif. (175 NEW)

A Cummins PT pump is mounted, ready for calibrating (right), with a GM Series 71 unit (left). Mechanic is releasing locking lever which fixes injector in position. Normally, both units would not be connected to drive shaft at same time. However, when shop is busy, test stand provides for setting up one job while another is in process.

Operator is applying connections on a Cummins PT pump, preparatory to testing it. After connections and piping are installed, mechanic will turn on a small electric-driven pump to fill the suction line and provide an instant supply of oil to pump. This prevents momentary wear on dry pump parts. Test stand has a fuel heating element for Cummins PT pumps to test solenoid units, and temperature gauges.




POWER



Two 8-cyl. GM "Electro-Motive Power" units are shown in operation for the Offshore Company drilling rig near Houma, La. The compact power package virtually eliminates set-up time. It is lightweight and is easily connected to motors, pumps and rotary table by means of cables.

ELECTRO-MOTIVE ADAPTS LOCOMOTIVE POWER UNIT TO DEEP WELL DRILLING

By JAMES W. CALVERT

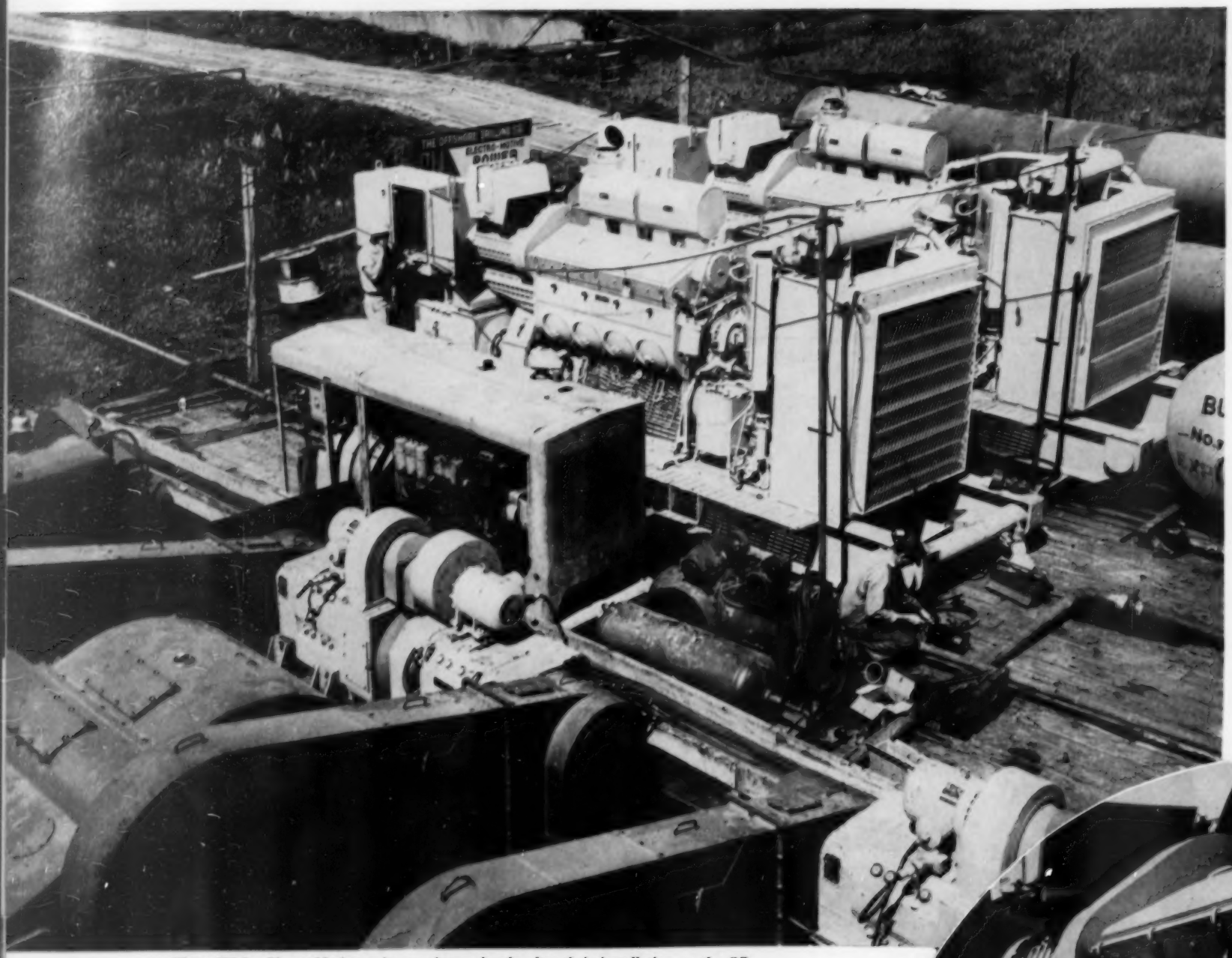
ENGINEERS from the Electro-Motive Division, General Motors Corp., have been spending the hot, humid days of spring and summer in the South Louisiana marshlands, adapting to new requirements the prime mover that won an enviable reputation, working on the railroad, for the last twenty-one years.

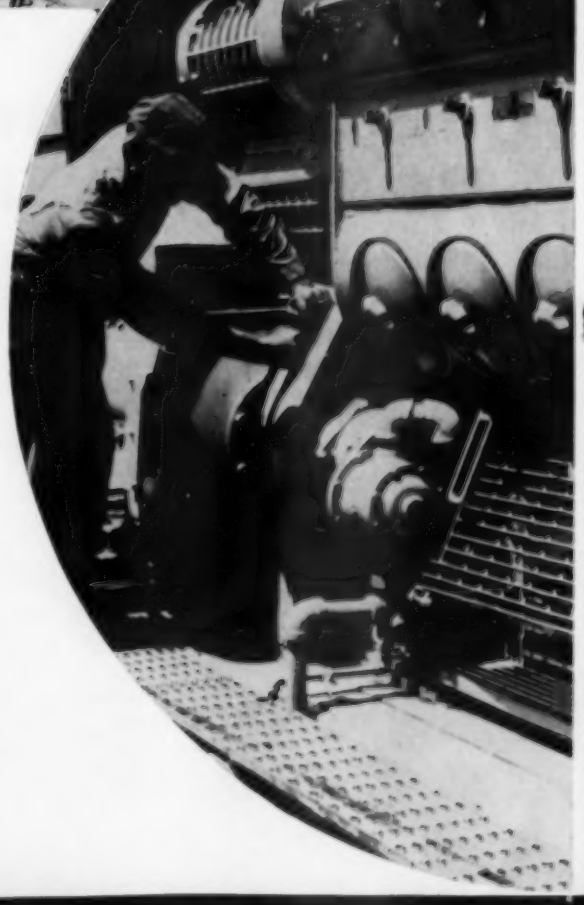
This activity culminated, recently, with the introduction to the oil industry of a new high horsepower, diesel-electric power unit that can be used in multiple for deep well drilling in both land and offshore operations. The new power plant utilizes components engineered and developed for General Motors diesel locomotives and proven successful in millions of miles of operations.

The first two drilling rig power units built by Electro-Motive were delivered in March to the National Supply Co., and were incorporated into a rig built for the Offshore Company, Baton Rouge, La. This company spudded a deep well south of Houma, La., on May 8.

The power plant, consists of two integral skid diesel generator sets, a series of Model D-39 direct current drive motors to power the mud pumps, draw works, rotary table and other drilling equipment, and a control stand at the driller's position which permits him to transfer power from one operation to another as easily as an organist pulling the stops on his console. The power units on the Offshore Company rig are SR-8 GM generator sets. The GM 567C diesels are V-8 engines, 8½ in. bore with 10 in. stroke. Each of the diesel engines develops 875 hp.

On each engine are two 500 kw generators mounted side by side on the common engine subbase. They are gear driven from the engine. The engine exciter is driven from a power take-off. The generators actually are traction motors with extra fields wound into them. The generators are driven by a 1½ in. diameter shaft. The engines have 45 degree angle between the cylinder banks and operate on the two-cycle principle with uniflow scavenging. Each unit is 27 ft. long, 7 ft. 10 in. wide, and 10 ft. high. An advantage of the unit is that it is light enough to be moved by truck and does not





These 875 hp Electro-Motive units are shown shortly after their installation on the Offshore Company drilling rig. They are the same type of engines which power a great number of railroad locomotives. Direct current from the two generating sets (upper right) is supplied to the motors to power pumps (foreground) and to the drawworks and rotary table.

require special foundations, as do many types of oil field power plants.

An engine has a total displacement of 4536, piston speed of 1390 ft. per min., continuous torque of 5500 ft. lb., compression ratio of 16.1. Its five precision type main bearings are pressure lubricated and piston cooling is by direct pressure stream.

The factory fuel guarantee of this particular type engine is .382 lbs. per bhp per hour for continuous load, although it is difficult to compute the fuel consumption of a drilling rig. Frequent changes in engine speed, sudden shifting of power requirements, place a heavy demand upon oil field power units. At the Offshore Company rig, a frequently overflowing day tank made it impossible to accurately determine the hourly fuel consumption.

These two units supply the entire power needs of the drilling operation. Conduits lead from the generator sets to the mud pumps and to the derrick floor. There are two Ideal G-1000 mud pumps, and two 625-hp motors for each pump so arranged by chain drive to each end of the pinion shaft that a failure of one motor would permit the other to carry the entire load.

There are two motors to supply power to the draw works and an arrangement has been made to hook up a third motor to the rotary table, if desired, although the draw works on the Offshore Company rig has a rotary drive so the third motor is not necessary. These heavy-duty industrial motors are rated at 625 hp at approximately 1000 rpm. Continuous rating is 670 amperes with short time rating of 1000 amp for intermittent operations. The electrical control equipment consists of three cabinets: 1) the generator control mounted on the skid, 2) the motor control cabinet mounted adjacent to the engines, and 3) the driller's console at his regular position on the platform. All equip-

Close-up of one of the EMD diesel units delivered to National Supply Company to power the rig for Offshore Company.

View of the Offshore Company drilling platform. Note the two GM series wound motors which are powered by the diesels.

ment is remotely controlled from the driller's position on the platform. The driller's stand has speed control for the two mud pumps, hoist speed control, rotary table speed control, auxiliary motor speed control, drill-hoist switch, table rotation switch, spin-out switch, emergency stop, shutdown switch, hoist motor current indicator, table motor current indicator, mud pump indicators, hoist limit light and alarm and engine speed control switch. The driller can, by manipulating the various push buttons and switches at his command, shift power from the mud pumps to the draw works when going in or out of the hole, or from the draw works to the mud pumps if additional pressure is demanded.

The greatest load demanded of the power units on the Offshore Company rig was when 9⅝ in. casing was set at 10,500 ft. This constituted a suspended load in excess of 400,000 pounds. There is nothing new about all-electric power in oil drilling operations. Oil men have been using electricity for more than a quarter of a century. What makes the GM unit unusual is that it was virtually lifted bodily from the diesel-electric locomotive and transplanted to the oil fields. The D-39 direct current driving motors actually are the traction motors found on the diesel-electric locomotive. The diesel engines and the electrical driving equipment have long been standard in the railroad industry.

The company intends to adapt its six and 12 cylinder engines, as well as the 8, to the heavy-duty oil field work. The average cost of an installation, using the eight-cylinder engine as the prime power unit, will range from $180,000 to $325,000, depending upon the number of generator sets and traction motors required.

T. S. Stoneman of Baton Rouge, La., president of the Offshore Company, was GM's first customer. He announced that his company has ordered two more GM installations to be used on offshore rigs in the fabulous tidelands oil and gas fields off the coasts of Louisiana and Texas.

ACCESS ROADS OPENS PIONEER MESA FOR AIR RESEARCH TESTS

UNSUSPECTING tourists on Utah State Highway 15, near Zion National Park, soon will risk losing their breath over a sight more startling than the beauty of the colorful, eroded cliffs that have made visitors gasp these many years. If, in the late months of 1955, they chance to look toward the rim of Pioneer Mesa Mountain, they are quite likely to see a machine shoot out into space at supersonic speed, blossom a parachute, and drift 1500 ft. to the valley floor. Later, human experimenters may be seen ejecting themselves from these machines, to float safely under smaller parachutes.

Pioneer Mesa has been taken over by the Air Research and Development Command. A supersonic air research track is being built on the flat mesa top. It is considered almost ideal for testing, observing, and evaluating equipment designed to

"Cat Skinners," working on access road, had to be as daring as test pilots who will later be catapulted off track atop mesa at supersonic speeds. New research project is near Zion National Park.

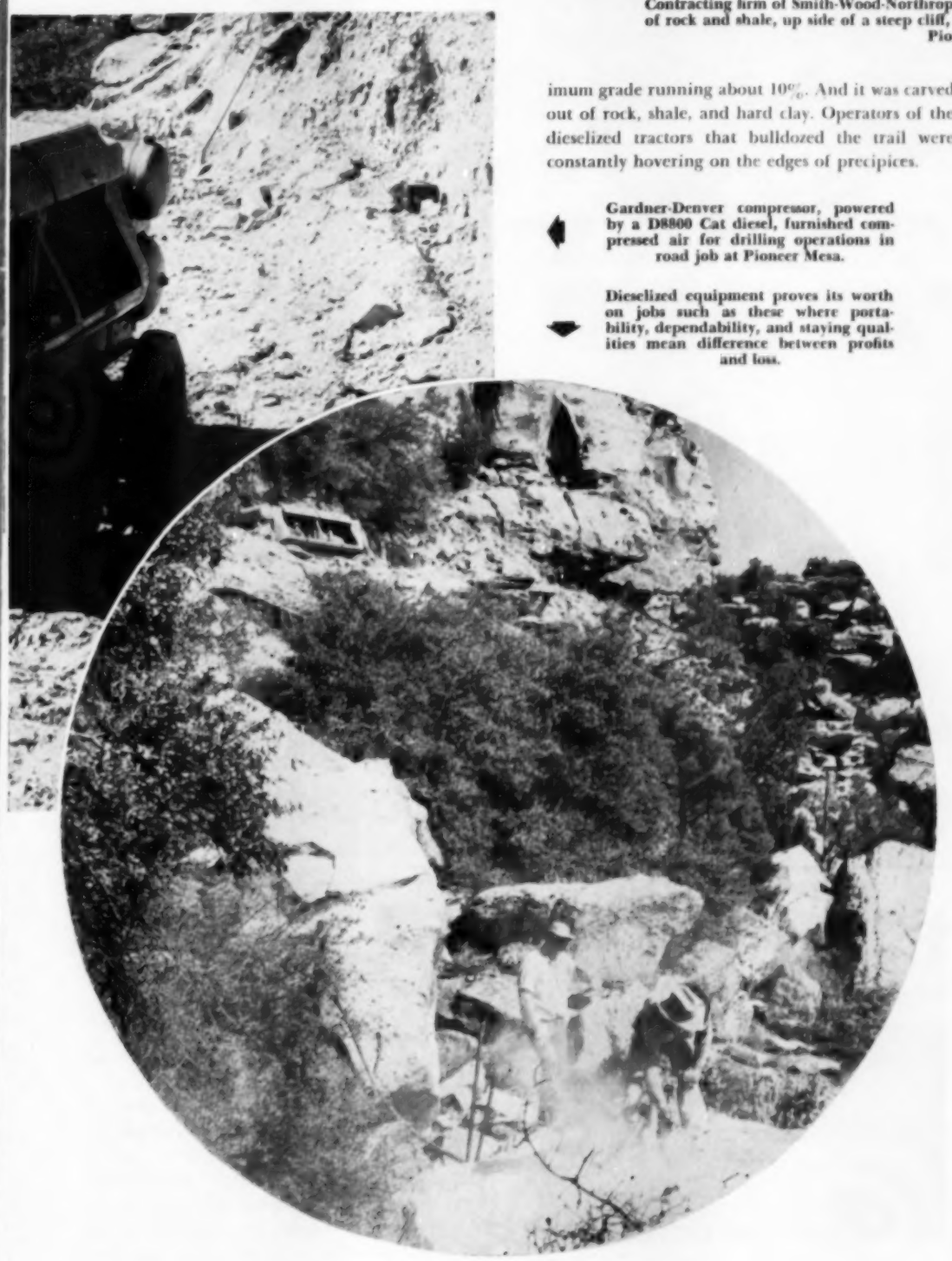
save the lives of combat pilots forced to leave jet planes. The mesa has an altitude of 5100 ft. In its 12,000-ft. length, its elevation varies only 20 ft. The width of the mesa, however, deviates between a quarter-mile and a mile.

Making the mesa top accessible to the researchers and their heavy, expensive and intricate equipment was a major problem. Its solution called for road-building machinery powered by rugged diesel engines and operated by men nearly as daring as the test pilots to come. Work started in 1954 to connect the workaday world with the "land of the sky" where supersonic experiments are planned.

The tortuous new road which bridges the long gap between the routine and the extraordinary is only 3.4 miles long. But it climbs fast, with the maximum grade running about 10%. And it was carved out of rock, shale, and hard clay. Operators of the dieselized tractors that bulldozed the trail were constantly hovering on the edges of precipices.

Contracting firm of Smith-Wood-Northrop, Hurricane, Utah, bulldozed a tortuous road out of rock and shale, up side of a steep cliff, sometimes at 10% grade, to reach top of 1500-ft. Pioneer Mesa.

Gardner-Denver compressor, powered by a D8800 Cat diesel, furnished compressed air for drilling operations in road job at Pioneer Mesa.



Dieselized equipment proves its worth on jobs such as these where portability, dependability, and staying qualities mean difference between profits and loss.

As soon as it is possible to truck materials needed for construction, a specially-designed track will be laid. Then rocket-powered cars will zoom down the one mile of track, pushing carriages in front at speeds greater than the speed of sound. Before the strange contraption reaches the end of the track, and the rim of the mesa, water brakes will be applied to halt and preserve the costly rocket engine. But the carriage will be catapulted into space where there is a sheer drop of 1500 ft. Water for the brakes, and for other purposes, will be pumped from the Virgin River which flows below at an elevation of 3200 ft.

The carriage, it is hoped, will be prevented from falling to destruction in the valley by a large parachute. If the early experimental efforts work out as planned, test pilots will ride the carriage over the cliff. In later experiments, they will test ejection devices and parachutes, and probably will float to earth, carefully protecting recording instruments.

Although rocket car tracks already are in use elsewhere, the lofty Utah testing ground will be the first to provide true simulation of flight conditions, for here model test planes, and eventually humans, actually will shoot into space. The 1500-ft. drop, it is believed, will give the first realistic, observable and measurable pilot seat ejection tests which can be accurately evaluated.

One test that is planned will help determine if pilots should be ejected while completely enclosed in a capsule when bailing out at extremely high altitudes. In actual use at extreme altitudes, such a capsule would not open into a parachute until it dropped to a lower altitude where the air pressure can be tolerated by the human body.

In addition to the access road and rocket track, the project includes the construction of buildings and a chain of instrument stations along the rails. These will make it possible to check the velocity of the rocket car by means of automatic cameras. The Air Research and Development Command also plans to use the Utah project to try out a new and revolutionary substitute for wind tunnels, used in studying and testing the designs of new planes.

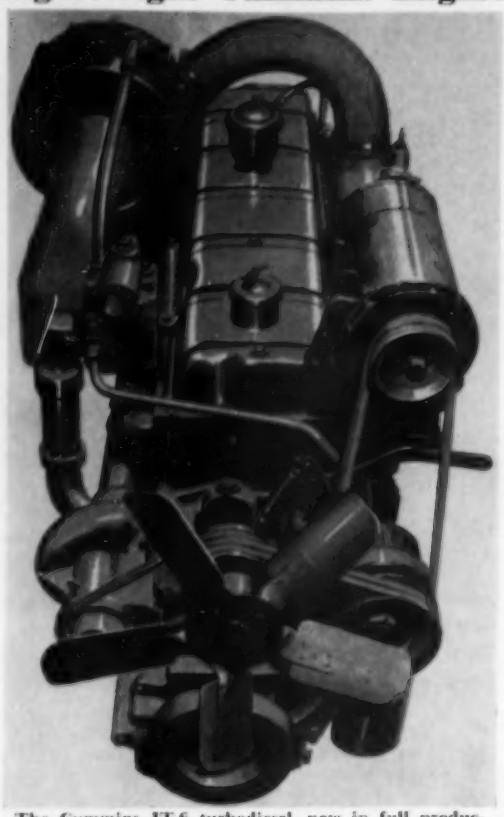
Lightweight Cummins Engine

A new lightweight, 175-hp "turbodiesel" has been announced by Cummins Engine Company, Inc., Designated the JT-6, it is a six-cylinder, in-line type with 4-1/8-in. bore, 5-in. stroke, and displacement of 401 cu. in. Installed in a truck, the JT-6 engine weighs only 1615 lbs. or 9.2 lbs. per hp. The turbodiesel weighs 800 lbs. less than other Cummins diesels of equivalent horsepower, and is comparable in weight to gasoline engines of similar horsepower.

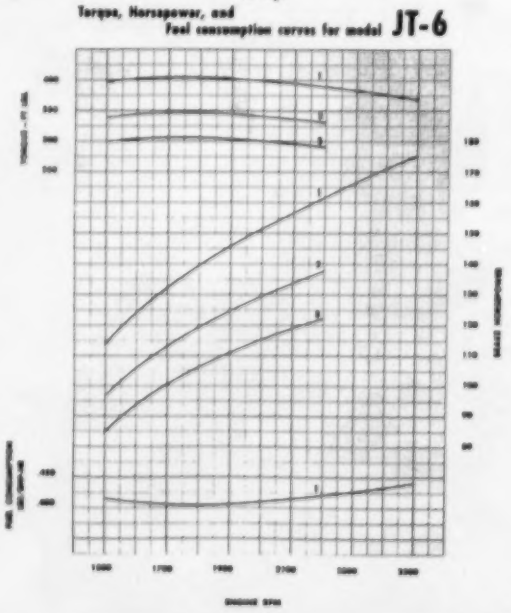
Cummins officials believe that development of this engine is one of the important milestones in diesel history. More than 50% of the trucks of over 26,000 lbs. are now dieselized, but only about 10% of those in the 19,500 lb. to 26,000 lb. GVW class are dieselized. Therefore, they expect the high horsepower, light weight, and diesel economy of the new engine to appeal to operators using trucks of the latter classification. (See DIESEL PROGRESS, Dec. 1954, "83 Turbocharged Diesels in new P.I.E. Fleet.") Also, these officials think the reduction in hourly operating costs possible with the JT-6, compared with gasoline engines, will appeal to contractors, mine and quarry operators using medium heavy-duty dump trucks, and to owners of ready-mix trucks. Release of this engine follows 15,000,000 miles of field test and preproduction operations. Research and design work was started in 1951 and included the development of the Cummins diesel race car which set new qualifying records for the Indianapolis 500-Mile Race in 1952. The engine in this car had the same basic design and the same displacement as the JT-6. The racing engine also was turbocharged.

Turbocharging is the key to the high horsepower available from this small engine. The JT-6 utilizes the normally wasted energy of the exhaust gas to create added power. This is accomplished by piping the exhaust through a turbine which is one element of the turbocharger. The JT-6 develops 40% more horsepower than the naturally-aspirated model. While the JT gives the maximum horsepower in the series, the other models are recommended for operations requiring 125-165 maximum horsepower.

A comparison shows the improved performance made possible by a new four-valve cylinder head design. This head, with two intake and two exhaust valves has improved breathing characteristics. This improvement is responsible for the improvement in power and economy of the JNS-6 compared to the JS-600. The combination of turbocharging and the new cylinder head allows the JT-6 to develop 175 horsepower with the same quantity of fuel as the JS-600 at 150 horsepower.



The Cummins JT-6 turbodiesel, now in full production. The weight is only 1615 pounds and it develops 175 hp.



The turbocharger on the JT-6 usually is mounted above the exhaust manifold on the right-hand side of the engine. However, mountings for other locations at the rear and side of the engine are available for meeting specific application requirements. Air is piped across the top of the engine to the intake manifold.

Truck manufacturers who have incorporated the JT-6 as a standard diesel for their light weight, space-saver designs are: Diamond T, Model 723-C tilt cab and 723 conventional tractor; Freightliner, spacemaker; Hendrickson, BD-24 space-saver; International, series 190, 200, 300 and 400 tilt cab, conventional and super-space saver designs; Kenworth, cab-beside-engine tractor; White, new 9000 TD space-saver. The JT-6 also is available in Beck, Flexible and Fitzjohn intercity buses.

Exceptional breathing characteristics are obtained in the JT-6-B with a four-valve cylinder head design, Cummins engineers say. The valves and injector are actuated from the engine camshaft through a push-tube and rocker lever linkage. Valve seats are stellite inserts to give long life. The exhaust valves also have stellite facing. The cylinder head is a single casting with large water passages for cooling of the injectors and valves.

The crankshaft is fully counterbalanced and has seven 3⅞-in. diameter main bearing journals. Crankpin bearing journals are 2⅝-in. diameter. All journals are Tocco hardened. Copper-lead, strip type bearings are used for all main and crank pin bearings. Connecting rods are I beam section steel forgings with 9½-in. length from center to center. The lubricating oil pump is located in the oil pan and is driven from the engine gear train. Oil is pumped through a tubular type oil cooler and flows through passages in the block and crankshaft to the main and connecting rod bearings. A 12-volt electric system is used on the turbodiesel. This makes an additional weight saving in the chassis by reducing the number of batteries required. Starting is by means of a key-switch on the dash, which actuates the electric starting motor and at the same time opens the shut-down valve on the PT fuel system.

Elected President

The Board of Directors of C. Lee Cook Company, Louisville, Kentucky, announce the election of Philip W. Mettling, formerly vice president of the company, to succeed Fred D. Durham as president and chief executive officer. Mr. Durham has resigned in order to devote full attention to his duties as president and director of Dover Corporation, of which C. Lee Cook is an operating division. Mr. Mettling is a vice president and director of Dover Corporation. C. Lee Cook was founded in 1888 to manufacture the first metallic packing used on the piston rods of steam locomotives. The design of its packing has kept pace with industrial needs and the company now supplies packing for steam engines, internal combustion engines, and compressors handling various gases operating under pressures up to 15,000 psi. As a logical development, its business was extended to include the manufacture of large diameter, high quality piston rings engineered to meet the severe demands of usage. C. Lee Cook has recently become a division of Dover Corporation, which, in addition to C. Lee Cook is comprised of W. C. Norris Manufacturer, Inc., of Tulsa, Oklahoma, and Rotary Lift Company of Memphis, Tennessee. W. C. Norris, formed in 1882, manufactures a wide variety of equipment for installation in oil wells after drilling is completed. Rotary Lift Company, which started in 1925, produced the world's first hydraulic service station lift.

Philip W. Mettling

The "Three Jacks"

A NEW waterway work-horse has been seen lately on the Intracoastal Canal and soon will be seen demonstrating her prowess on the Mississippi. The rugged *Three Jacks* has been earning high praise from all concerned with her design, construction and operation. The vessel is being operated under the direction of Captain C. L. Jones for the Gulf Oil Co. of Texas.

Built by John G. Jackson of Angleton, Texas early this year, she is of all-steel construction. Her length is 65 ft.; her beam, 18 ft. 6 in. and she draws 7 ft. of water. Her rugged Union diesel engine delivers 600 hp at 400 rpm. To quote the skipper, "this engine's performance has been exceptionally good." Shipboard personnel reports that *Three Jacks* outperforms many other vessels which are fitted with engines considerably larger.

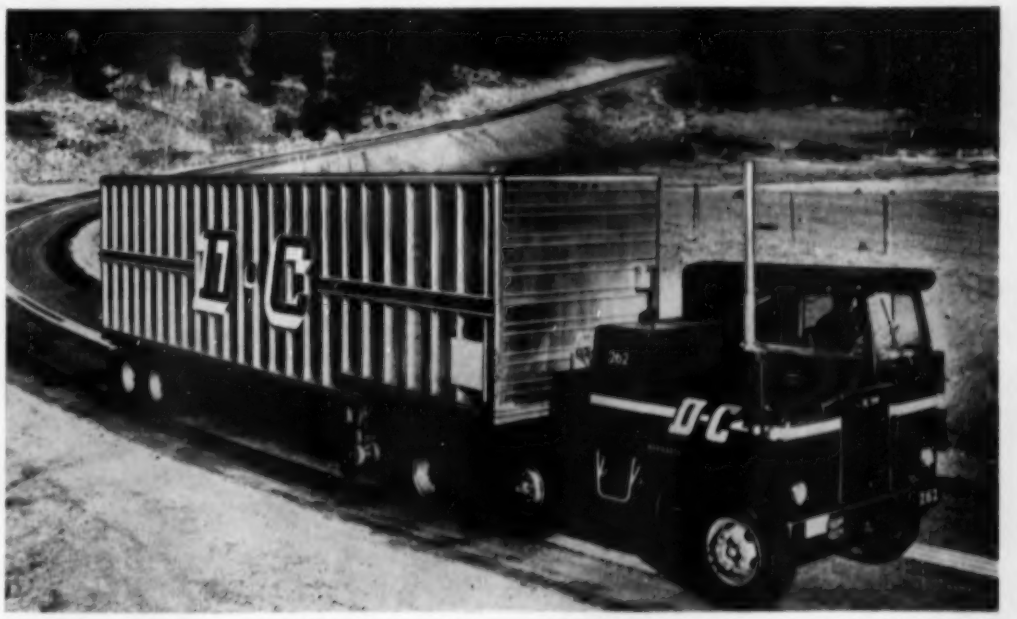
The Union propulsion unit is a Model P6, 6-cyl, supercharged engine with a bore of 12-in. and a stroke of 15-in. It is direct-reversing and air-starting. A keel type, divided cooling system provides cooled water for control of temperatures through a type F3 Union tube-and-shell heat exchanger. An audible-visible alarm system protects the engine against unusual lubricating oil and water jacket temperatures. The air starting is by a Quincy air compressor.

Six separate fuel tanks with a combined capacity of about 10,000 gallons permits long periods at work without interruption for re-fueling.

Modernized Tractor Fleet

To achieve the maximum pay load per trip on one of the nation's largest truck operations, Denver Chicago Trucking Company, Inc. has further modernized its fleet. George J. Kolowick, Jr., president, announces, by the addition of 60 new, lightweight Kenworth Model 522 cab-beside-engine tractors, powered by Model NHB-6 Cummins diesels. Founded some 25 years ago, Denver Chicago Trucking Company, Inc. has grown into a giant in the transportation field, offering coast-to-coast service by one carrier.

Engineered for driver safety and comfort with practically unlimited visibility, virtual elimination of vibration and engine noise, improved ventlation and other fatigue-reduction features, Kenworth's engineer say the CBE design also provides worthwhile weight savings, improvements in engine accessibility and ease of maintenance. Several years ago, dieselized tractors, including 15 Kenworth Model 825 trucks, inaugurated the firm's through-type sleeper service. The success of this program set the stage for extending this service across the nation. The new, lighter weight Kenworth CBE tractors

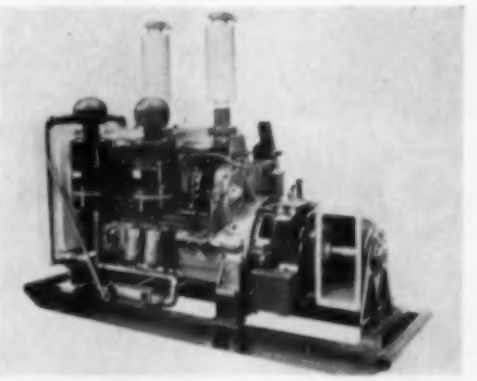


are rated at 200 hp with the Cummins engines turning at 2100 rpm. The transmission is a Spicer Model 8245, backed by a two-speed Model R-330-P Timken-Detroit rear axle.

New Diesel Torque-Converter Units

A line of diesel engine torque-converter power units is announced by P&H Diesel Engine Division, Harnischfeger Corporation. Built around the P&H 2-cycle diesel engine which is noted for its weight and space-saving design, the torque converter provides smooth, steady power over the full speed range. The torque converter has an unusual "cushioning" effect which entirely eliminates shock loads from driven equipment, resulting in better performance and longer life. An almost infinite range of speed may be obtained.

The torque converter is complete with its own fluid cooler. Various types of clutch arrangements may be had. A tail-shaft governor is available to control the output shaft speed. Twin Disc and Allison torque converters are currently being offered on these diesel units. P&H offers this unit on its complete line of diesels, from 2 to 6 cylinders, 30 to 255 horsepower. Details on these diesel engine torque-converter "packages" may be obtained by writing Harnischfeger Corporation, Diesel Engine Division, Crystal Lake, Illinois.



A P&H skid mounted diesel torque converter unit with a Twin Disc Series 10,000 torque converter having a 5.4 torque ratio with operation at 1600-1800 rpm.

GENERAL MOTORS

POWERAMA

THOUSANDS of persons will have the first opportunities of their lives to observe the many dramatic contributions to our society made by diesel engines when General Motors stages its 26-day Powerama in Chicago. This 23-acre exhibition of "manufactured might" opens August 31 on the lakefront near Soldier Field and will continue through September 25. Visitors will be admitted without charge.

The gigantic nature of the Powerama was described in DIESEL PROGRESS in July, page 70. On these pages, pictures show a very small portion of the exhibits and demonstrations that will educate and entertain the public. The gates will open daily at 10 a.m. and stay open until 11 o'clock each night.

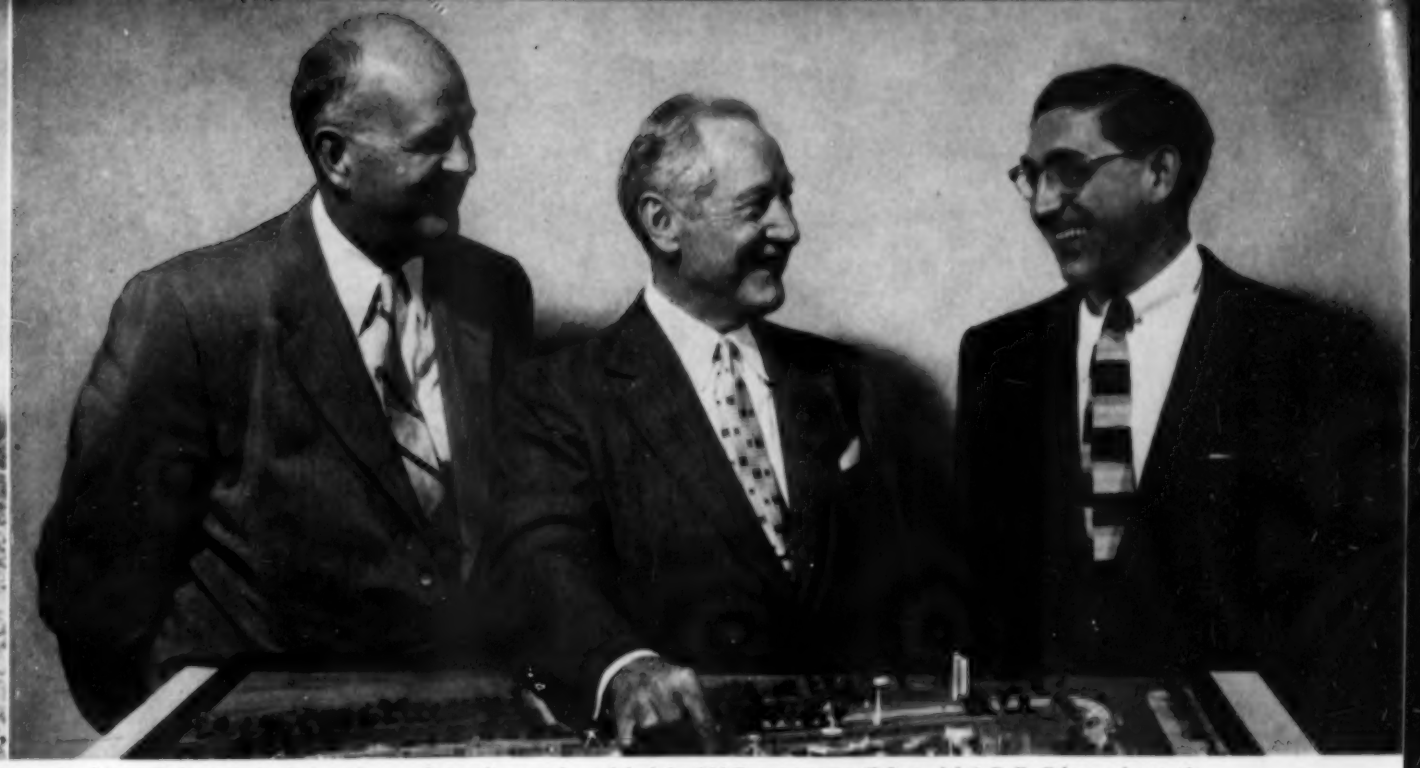
This "world's fair of power" will include a pier in Lake Michigan where visitors can board a U. S. Navy submarine, a pleasure launch, and the shrimper shown here. While there will be many consumer products to catch the eye—such as the automobiles that were featured in GM's great Motorama, modern kitchens, and household appliances—the stellar performers in the Powerama will be the huge earth-movers, locomotives, drilling rigs, cotton gins and other dieselized equipment that provide employment and better living for the people of the world.

Among the many displays of farm, road-building and earth-moving machinery, will be the latest in dieselized highway tractors.

A mock-up of this famous Convair XFY-1 vertical take-off fighter will be on display at the exhibit. It is powered by an Allison turbo-prop engine.

***Miss Powerama*, a 65-foot shrimp boat which will come from the Gulf of Mexico to the Powerama, features a 289-hp Model 6-110 diesel.**

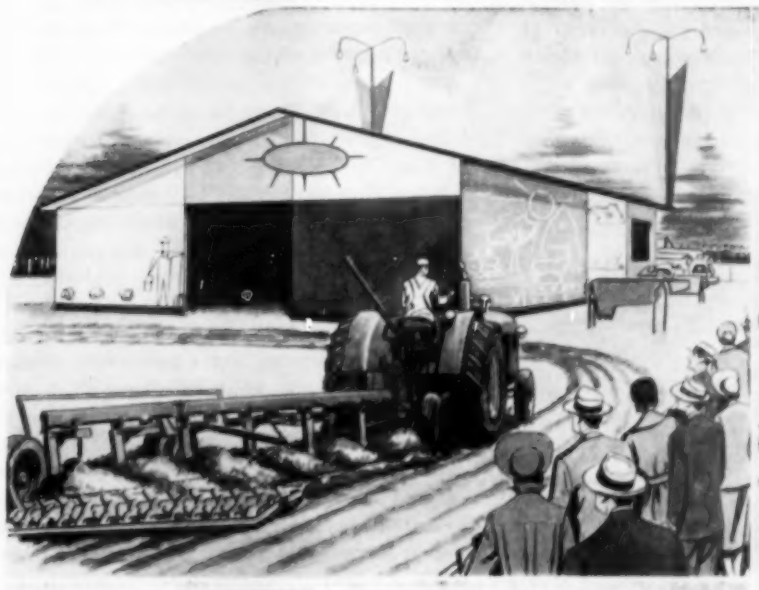
The Allison Torqmatic drive will be very much in evidence on earth-moving vehicles like this 50-ton Euclid truck. Allison has built over 50,000 Torqmatic drives for service in the military and industrial fields.



Inspecting a scale model of the GM Powerama are (left to right) C. R. Osborn, vice president in charge of GM's engine group; GM President Harlow H. Curtice; and Semon E. Knudsen, general manager of Detroit Diesel Division.

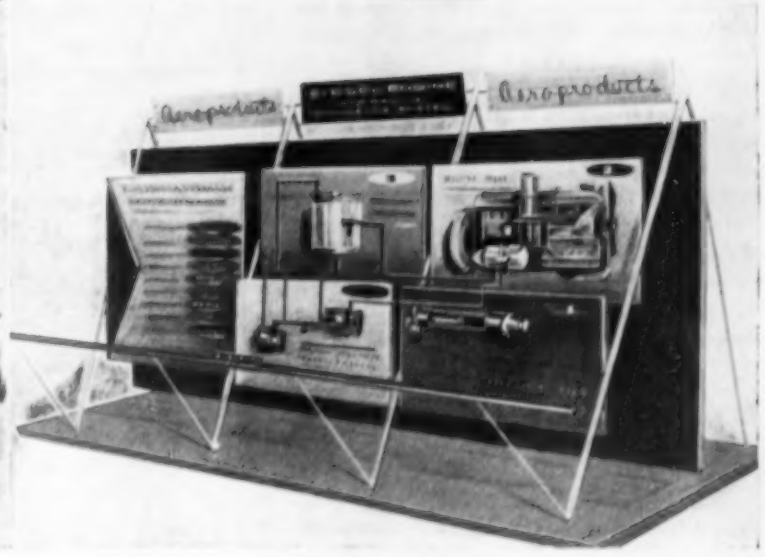
Below, top: Advance sketch of one of Detroit Diesel Engine Division's farm exhibits at the GM Powerama. A plot will be plowed and re-compacted to normal hardness 13 times daily.

Bottom: GM's production of 100 million horsepower will be symbolized by a display featuring a Detroit Diesel Series 71 engine. It will be painted gold and will revolve on a turntable.



Below, top: Drawing of the sawmill exhibition at the General Motors Powerama where thousands of visitors will have their first opportunity to see hefty logs sawed into lumber.

Bottom: On display will be the new hydraulic cranking motor system developed by Aeroproducts Operations, Allison Division.



AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

TON-MILES PER GALLON

EVERYONE wants a yardstick with which to measure the relative merits of one thing against another. Yet, how few there are that are really adequate to take into account all of the factors involved! As a measure of the overall efficiency of a diesel, many have seized upon ton-miles per gallon. The trend is worthy of a little thought.

Certainly gross ton-miles do represent a measure of work done by the engine. Also, gallons of fuel consumed in accomplishing a given amount of work is a perfect gauge of economy. Unfortunately, however, the ton-mile unit ignores the most important factor in any equation of economic efficiency-time.

We measure the *economy* of an engine in terms of pounds of fuel per brake horsepower-hour. So, logically, the time factor must be included in our measure of *work*. This suggests the ton-mile-hour, rather than just the ton-mile. If we have an unlimited time in which to move one ton one mile, then the more slowly we accomplish the job, the fewer horsepower-hours it should take and so the less fuel we should consume.

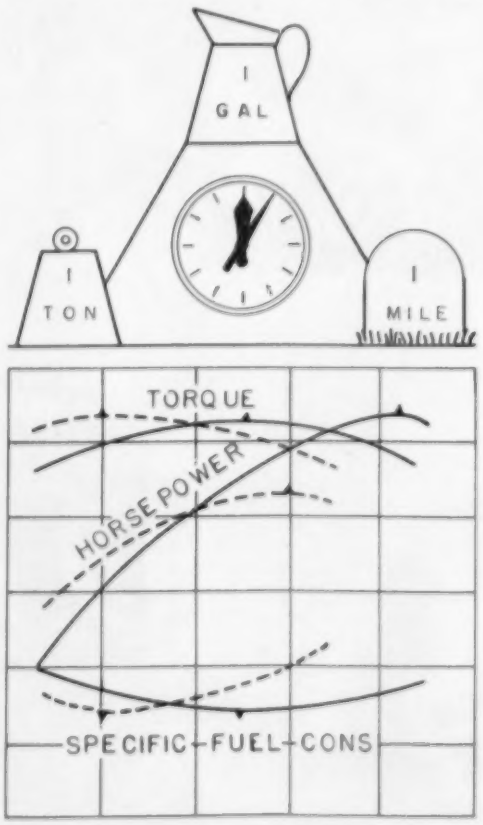
Modern industrial efficiency, however, is measured not alone by how little energy is consumed in accomplishing an operation; but equally by how quickly it is done. It requires more power to run a truck with a given load at 50 mph than at 25. Speed costs money; but, within limits, is worth it.

Furthermore, as those responsible for rising taxes on diesel fuel have been at pains to point out, the ton-miles per gallon produced by a vehicle of high gross weight greatly exceeds that of a lighter vehicle. For example, a 50,000-pound GCW vehicle in one mile produces 25 ton-miles. At eight miles per gallon, then, it will produce 200 ton-miles per gallon. One with 10,000 pounds GVW, or five tons, will produce but five ton-miles per mile. It might reasonably be expected to show 16 miles per gallon, if dieselized or 80 ton-miles per gallon. This by no means proves one power plant to be more efficient than the other. It merely shows that ton-mileage per gallon *per se* is no criterion of engine efficiency and performance.

Current enthusiasm for astronomical horsepower in passenger cars has forced gasoline engine designers to revise radically some of the characteristics of design in their mad race to keep up with the craze. Some of the results have undoubtedly been sound improvements; but others raise questions.

To derive the greatest practicable horsepower output from an engine of given piston displacement, it is necessary, among other things, to increase rotative speed without exceeding safe limits of piston speed. This has led to the present prevalence of short-stroke, eight-cylinder engines. Also, to secure the maximum output at such high rpm, it is necessary to carry the torque much higher up on the speed scale than has hitherto been regarded as sound practice, since horsepower is the product of speed and torque.

High peak torque speed, however, poses several problems: Since the greatest economy occurs approximately at torque peak, these new passenger car engines tend to move the economy range above that of prevailing driving speeds. Raising the torque at the higher speeds necessarily reduces it at the lower and this certainly militates against good low-speed performance. It also tends to make smooth idling more difficult. That overall results are no worse than they are is undoubtedly due in no small measure to the benefits conferred by the now prevalent automatic transmissions.



Neither diesel-design thinking nor that of designers of heavy-duty gasoline engines parallels that of those catering to current passenger car trends. While a moderate increase in the speed at which maximum torque is reached is discernible in some of the newer truck diesels, there is a strong conservative coterie which clings to the goal of maximum torque at speeds below 1000 rpm.

There is no denying the attraction to drivers offered by an engine which will "hang on" to the bitter end on a hard pull. It often permits a grade to be surmounted with one less gearshift. But to the maintenance man, the picture is not quite the same. A laboring or lugging engine suffers more in a mile than it would in a hundred miles at a few hundred more revolutions per minute. Also, since maximum economy is bound to be found in the vicinity of peak torque, specific fuel consumption is certain to be greater at normal operating speeds in an engine whose torque peaks at low speed.

There is scant real benefit in being able to climb a hill in a gear one step faster, if the slow speed of the engine results in slower vehicle speed than in the next slower gear at higher engine speed. Moreover, examination of the test curves of engines of various types shows that the lower the speed at which the torque peaks, the higher the specific fuel consumption curve rises toward the higher speeds. An engine which will show the best economy, then, would seem to require its maximum torque to be developed at the lower end of the normal range of driving speeds. Lower peaking speed will invite destructive lugging and result in poorer economy at average running speeds. Higher, likewise will militate against the best economy and flexibility.

Terminate Electrification In Favor of Diesel

Termination of electrified train operations on Great Northern's main line through the Cascade mountains in Washington, and complete dieselization of that 73-mile segment of the railway, was authorized May 12 in St. Paul by the company's directors. The project involves the 7.79-mile Cascade Tunnel, longest railway bore in the Western Hemisphere, and is the result of engineering study over the past 2 years, said John M. Budd, Great Northern president. Expected to produce substantial operating economies, Mr. Budd added that the change in power through the Cascades will be almost entirely paid for by salvage recovered from electrical installations and equipment now in use—overhead wires and electric locomotives.

Work on abandonment of electrified operations in the Cascades will begin early this Summer, and establishment of all-diesel transportation in that area is scheduled for August 1, 1956. The change will conclude nearly 50 years' use of electricity by Great Northern in moving passenger and freight trains across the Cascades through Stevens Pass. The railway began using electric power in 1909 to move trains through the original Cascade Tunnel, a 2½-mile bore. The electrified zone was expanded greatly during construction of the 7.79-mile Cascade Tunnel, which was opened for service in 1929, and now extends 73 miles between Wenatchee and Skykomish, Washington.

Mr. Budd said that the diesel operations through the Cascade Tunnel will be made by installation of a ventilating system at the east portal at Berne, Wash. The system will include two 8-foot fans capable of providing 550,000 cubic feet of air per minute to the empty bore, and an automatically-controlled door at the east portal. Diesel locomotives also would be equipped with devices to spray cool water on radiators of the power units to avoid overheating while passing through the tunnel.

The ventilating system, Mr. Budd added, would be used principally for heavy tonnage freight trains moving east and uphill through the tunnel. He said that while the fans would not have to be operated while passenger and westbound freight trains run through the bore, the ventilating system would be used to clear the tunnel air after passage of every train in either direction.

Scholarship Awarded

The Society of Naval Architects and Marine Engineers, now in its sixty-third year of continuous activity, has announced the award of two graduate scholarships for the 1955-56 academic-year, following its annual practice. The recipients were selected by the Scholarships Committee, headed by Charles G. Cooper, vice president, The Cooper-Bessemer Corporation, and approved at a recent meeting of the Executive Committee of the Society.

At the request of the successful candidates, one of the awards this year is for postgraduate study in marine engineering and the other in naval architecture. The recipient of the new award for advanced marine engineering study is Henry F. Curtis of New Orleans, La. He will enter Massachusetts Institute of Technology in the fall, having graduated from this school in 1951. Currently he is serving in the United States Navy at the Office of the Supervisor of Shipbuilding, New Orleans. The other award went to Francis J. Bartlett of Seattle, Wash., who will undertake advanced studies in Naval architecture at the University of Michigan, from which school he graduated in 1952. He is now employed by the Puget Sound Bridge and Dredging Company, Seattle.

Random Thoughts from a Filter Engineer

by J. P. Van Sweringen

- **PUTTING A QUART IN A PINT BOTTLE**
- **WHY SOME CATALOGS ARE ALWAYS OUT-OF-DATE**
- **THAT SOMETHING INVISIBLE THAT COMES WITH EVERY FILTER**

PUTTING A QUART IN A PINT BOTTLE

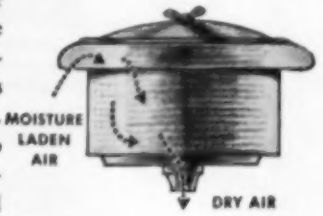
More than a few times we've been called in to provide a filter for an engine when there wasn't enough space to install a filter with adequate capacity. As a result, a filter with less than desired capacity had to be used. But even when this smaller filter manages to handle more air than it was designed for, results are not entirely satisfactory. The filter has to work too hard. And filters, like automobiles, operate more efficiently when not always run at "top speed".

It never pays to try to put a quart in a pint bottle. The best way to avoid the big engine—small filter problem is to consult a filter engineer *before* you build that engine. Most filter problems can be solved when you're in the preliminary stages of designing an engine.

WHY SOME CATALOGS ARE ALWAYS OUT-OF-DATE

I wonder if you ever had this happen to you: you plan a catalog carefully, make sure it is *complete*, then almost before it reaches your customers it's already out-of-date. It's happened to us. Even with the hundreds of filters we make, there's always some new filter problem which requires a *new* filter to solve it best.

One problem that called for a new filter was dumped into our laps the other day by an owner of some sensitive measuring instruments. He wanted us to dry some "wet air". The problem was not to remove droplets of moisture. For years we've had filters that could do this. He wanted us to build a special filter that would remove "wet air", air that was moist but not humid enough to form droplets.



Well, we designed an open-to-the-air model that did the trick. Air goes under a hood, passes through a dessicant cartridge, then out the base of the filter to the instrument chamber. Tests showed that the air was virtually moisture-free. We had removed the humidity.

So if you don't see what you want in our catalog, ask for it. We may have a unit that will fit your needs. Or where sizeable quantities are involved we'll be glad to engineer a filter for you. We have 30 years experience engineering filters that solve special problems.

THAT SOMETHING INVISIBLE THAT COMES WITH EVERY FILTER

When you buy a product—be it a small filter or a large generator—you usually take for granted the service that comes along with it. Product features often obscure service to the extent that it isn't even mentioned before the sale is made. Yet service is the great unseen part of a product . . . the part that guarantees that the product performs at its best.

Map shows 83 Air-Maze representatives.

When you buy filters from Air-Maze, quick service is as near as your phone. Our trained representatives are located in 83 cities across the nation. They stand ready with friendly, competent help, whenever you need it. The Air-Maze Corp., 25000 Miles Rd., Cleveland 28, Ohio.

AFI MEMBER AIR FILTER INSTITUTE

AIR-MAZE

The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

Cutaway view of the new CRT-3330 Torqmatic transmission. The new Torqmatic incorporates the Allison single-stage converter, the Allison "quick-shift" range gearing and the transfer gearing drop box. Approximate weights, depending upon options, range from 1160 to 1310 lbs. Height overall, approximately 42 inches; width overall, approximately 20 inches; length overall, approximately 35 inches direct mounted, and approximately 40 inches remote mounted.

THE ALLISON CRT-3330 TORQMATIC DRIVE

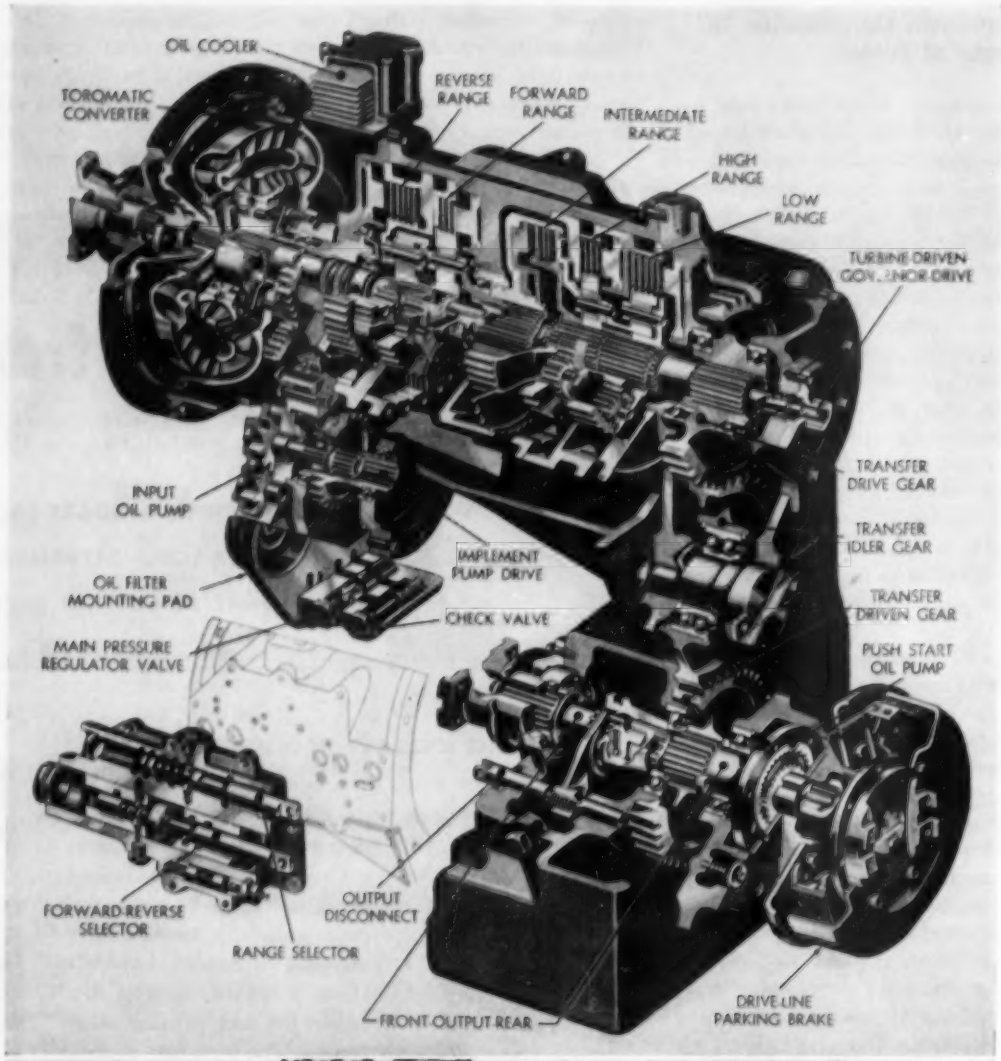
A new Torqmatic transmission designed especially for industrial vehicles requiring forward and reverse operations in all speeds has been announced by Allison Division of General Motors. Known as the CRT-3330, the new Torqmatic drive will be used with diesel engines in the 70 to 130 horsepower class. It has three speeds forward and three in reverse, with a wide range of application in loaders, graders and fork-lift trucks.

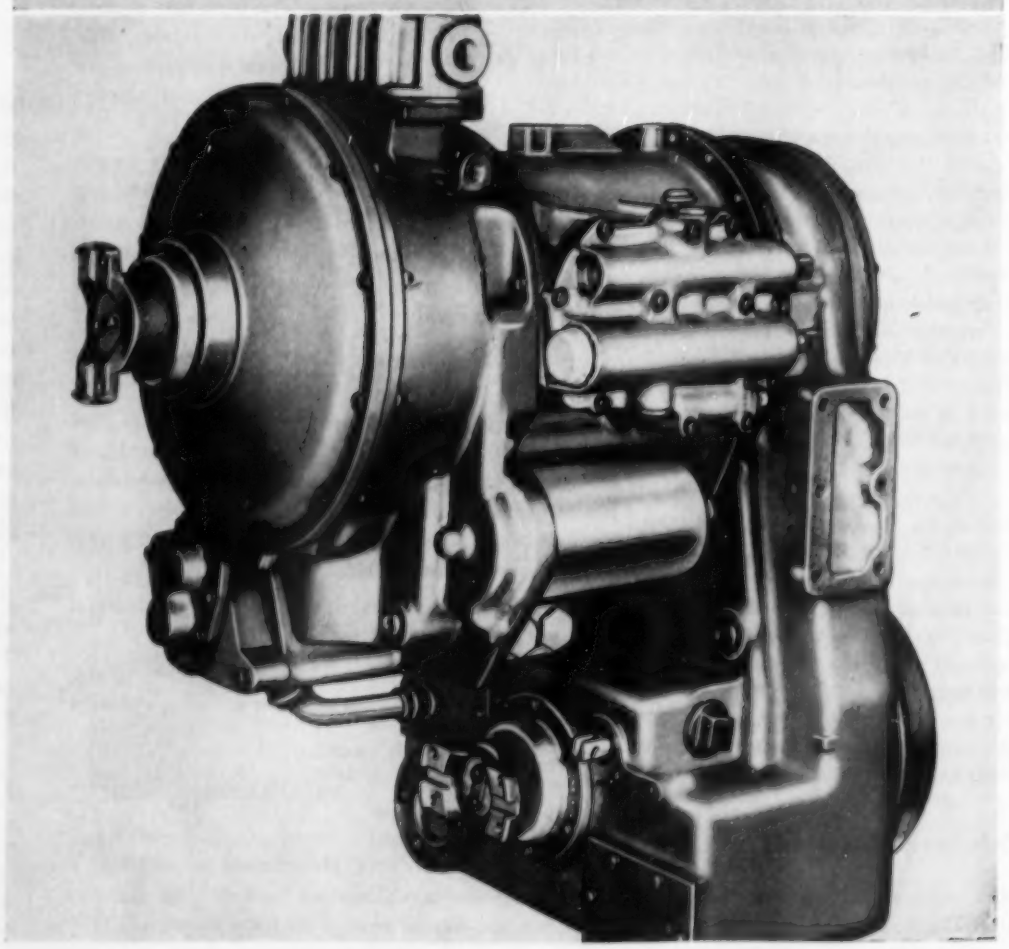
"In designing this new Torqmatic drive, Allison engineers have combined the advantages of the Torqmatic converter and quick-shift Torqmatic transmission into one package for greater installation advantages," Mr. K. H. Hoffman, Manager of Transmission Operations of Allison, declared.

The CRT-3330 consists of the Allison single stage converter, the Allison quick-shift range gearing and transfer gearing drop box with front and rear outputs. It also includes a built-in drive for the implement pump. A quick cutoff valve is provided for disengaging the transmission, thus making the full engine power completely available for implement pump operation.

"Economical and operational advantages to be realized through use of the CRT-3330, make this transmission a major advancement in the fast-growing field of construction equipment," Mr. Hoffman said. "The CRT-3330 permits the engine to operate at maximum efficiency, prevents harmful engine lugging, eliminates shock load damage to engine and drive train components, speeds the job-cycle, increases equipment availability, reduces operator training time and provides more effective horsepower."

Available with the CRT-3330 Torqmatic transmission are a variety of options and accessories including: two converter capacities, two implement pump drive ratios, filter, two transfer gear ratios, converter dry housing, disconnect for one output shaft, parking brake, governor drive, oil cooler and engine or remote mounting.





Left-front view of the new Allison CRT-3330 Torqmatic Drive shows the compact arrangement of its three-in-one package. This transmission provides three speeds forward and three speeds reverse with Allison developed "Sense-Feel" hydraulic control for "feeling" the load. Front output is provided with a mechanical disconnect. Transmission can be direct or remote mounted.

Straws to Today's Business News

SEATTLE Transit System will take delivery in November and December on 100 new 51-passenger diesel buses manufactured by General Motors Corp.

SEABOARD Air Line Railroad has ordered 10 new diesel-electric freight locomotives from the Electro-Motive Division of GMC. Cost is $1.6 million. Twelve existing Seaboard locomotives are being rebuilt and converted to diesel by Electro-Motive at a cost of 1.5 million dollars.

LINES OF credit recently extended by the Export-Import Bank to U. S. manufacturers for sale of equipment abroad included: Bucyrus-Erie Co., $1.7 million for excavating and drilling machines; Gar Wood Industries, $700,000 for a variety of road building equipment.

HARNISCHFEGER Corp. reported declines in both net sales and earnings for the six-month period ending April 20, 1955 as compared to the corresponding period of 1954. Sales in 1955 were $30,312,317 compared with $30,997,154 for the same 6-month period of 1954, and earnings dropped from $1,505,072 to $585,008.

THE ROCK ISLAND & Pacific Railroad reported improved figures for the first five months of the calendar year, compared with a year earlier. For example, net income was up to $6,250,753 compared with $5,633,612; and total railway operating revenue was $75,668,892 as against $75,217,429.

CONSOLIDATED Diesel Electric Corp. showed net income for the nine months ending April 30 of $829,605, a gain of 208% over the $269,188 of the same 1954 period. "The outlook for the future continues bright," said Norman I. Schafler, president. "We are continuing our efforts to improve our operations, expand our activities in new products development, and take all other steps needed to maintain our position as the leading company in the aviation ground support industry."

CHESTER C. THOMPSON, American Waterways Operators president, reports that waterborne traffic on the inland waterways in the first half of the year ran far ahead of the same period last year. He said economic trends this year make the movement of bulk fuels, raw materials, and products as heavy as was predicted the first of the year when optimism was high.

To Step Up Capacity

LaPorte City, Iowa, will increase the firm capacity of its municipal power plant from 700 to 1250 kw with the addition of a fifth unit. A contract has been awarded to Worthington Corp. for an 840-kw dual-fuel diesel-electric set. The new engine will be a Worthington type SDRGO of six cylinders, producing 1195 horsepower at 450 rpm. It will be direct connected to an Electric Machinery generator.

LaPorte City established its municipal power plant in 1935 with two Worthington diesels of 150 and 200 kw capacity. In 1939 and 1949, respectively, 350 kw and 550 kw Worthington diesels were added. With the addition of the 840 unit late this year, the total plant capacity will be 2090 kw or just about six times the original capacity. Firm capacity will be 8⅓ times the original 20 years ago.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

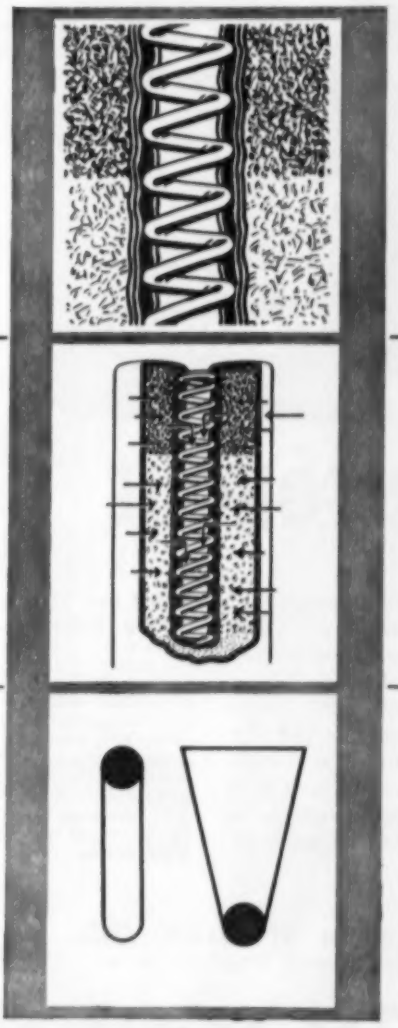
If you paid $5000.00 for an Engine would you protect it with a 79¢ Filter??

Thirty years of product development have made Winslow filters best for your engines... continuing research insures constant improvement in materials and performance.

BARGAIN HUNTING FOR FILTERS JUST DOESN'T MAKE SENSE, REGARDLESS OF ENGINE PRICE. THE ONLY BARGAIN YOU CAN BUY IS PERFORMANCE—LONGER ENGINE LIFE, REDUCED MAINTENANCE COST, LONGER USEFUL OIL LIFE AND GREATER OPERATING EFFICIENCY.

THE PROBLEM

Complete engine protection at all times, filtering all the lube oil under either hot or cold oil conditions.



WINSLOW'S ANSWER

The Winslow CP* (Controlled Pressure) design which permits use of a dense filtering media and a section of less dense filtering media within a single element. Cold oil is filtered through the less dense media which removes all dangerous particles from the oil.

An element with definite and predictable flow and pressure characteristics for various engine applications and requirements.

In a Winslow CP* element the ratio of filter materials determines the rate of oil flow through the element. This ratio is set for each size and type CP* element, based on laboratory and field tests.

An element that does not permit surface clogging with consequent reduction of efficiency and dirt holding capacity.

The CP* design of progressive filtration. A "V" shaped arrangement of the filtering media which traps smaller and smaller particles as the oil progresses toward the core of the element. This construction increases the efficiency and life of the element.

. . . . positive evidence that Winslow filters are your best bargain in complete engine protection regardless of original cost ! ! !

WINSLOW FILTERS **CP is fully protected by patents and trademarks*

55-A-1 **Winslow Engineering Company** 4069 Hollis Street • Oakland 8, California

Acquires Seal Manufacturing Company

A development of great import to the diesel industry was the recent acquisition by Koppers Co., Inc., of the Philadelphia seal manufacturing firm of Kuchler-Huhn Co., Inc. This action unites two leading parts makers. Kuchler-Huhn, incorporated in 1937, is best known for its mechanical seals for rotating shafts for high-speed, high-temperature machinery, especially jet engines and gas turbines. Fred C. Foy, Koppers president, said the acquired company has become a department of Koppers Metal Products Division, Baltimore. Theodore C. Kuchler, who was president of Kuchler-Huhn, has established his office in the Piston Ring and Seal department in Baltimore where he is helping build up a staff of engineers and draftsmen to facilitate the development of new designs and materials already in progress. His company had done considerable work on special seals for boiler feed pumps, atomic reactor circulating equipment, and other types of centrifugal machinery which operates at high speeds and temperatures.

For its part, the Koppers Metal Products Division already was at work on a contract from the Wright Air Development Center, Dayton, O., for design and material development for high-speed, high-temperature seals for turbo-jet applications. Under the supervision of John Pennington, Technical department manager, a staff of 60 engineers and technicians is working on this project.

John A. Worthington, widely known in the diesel industry, is manager of the Piston Ring and Seal department of Koppers Metal Products Division. Mr. Worthington says that problems being tackled today by the company's metallurgical and mechanical laboratories in the area of sealing gases and liquids under extreme pressures and high temperatures compares in interest with the solutions achieved for the aircraft industry 25 years ago in relation to piston ring troubles.

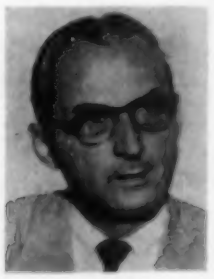
Depth Type Oil Filter Cartridge

"Kleer-Pac" is the trade name of a new depth-type oil filter cartridge added to the line of filter elements manufactured by Houdaille-Hershey of Indiana., Filtration Division. This new filter cartridge, built especially for their line of Honan-Crane Bulk Refill Oil Filters, is interchangeable with the bulk type refills. Nine sizes are available. Included is a Kleer-Pac Cartridge built to military standards which can be used in Honan-Crane Multi-Cartridge Filters or any filter using that size of oil filtration cartridge. A combination of two filter media is used in Kleer-Pac. Many layers of cellulose material called Kimpak are first wound around a built-in metal center tube. The remainder of the cartridge is cotton waste tightly spun around the Kimpac by a special process which insures uniform layers throughout. The entire filter element is enclosed in a sturdy perforated metal case equipped with a bail for easy handling.

Initial filtering to remove the larger solid particles is accomplished by the cotton waste which has high dirt holding capacity. The Kimpac section performs the "polishing job." Both media are inert and will not change or remove additives.

Kleer-Pac is recommended for efficient, low cost filtration of engine lube oils, hydraulic oils, turbine oils, quench oils, and cutting and grinding oils. For full details about Kleer-Pac write Houdaille-Hershey of Indiana, Inc., 946 Sixth Street, Lebanon, Indiana.

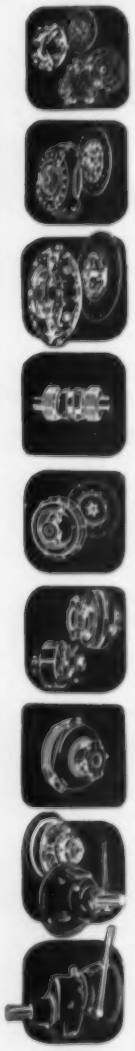
Director Of Purchases



J. M. Steffee

Appointment of J. M. Steffee as vice-president and director of purchases of Mack Manufacturing Corporation, has been announced by P. O. Peterson, president. Mr. Steffee had been administrative assistant to the president of the big truck and bus manufacturing company. Before joining Mack last April 1, he was assistant director of purchases of the Studebaker Corporation, South Bend, Indiana, in charge of all purchases for that company's aviation division.

ROCKFORD



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INFREQUENT ADJUSTMENT
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* Equally spaced, hardened and ground roller cams, bearing upon hard steel insets, exert heavy pressure evenly over the entire ROCKFORD Over-Center CLUTCH face — producing unusually high torque, for the clutch size and weight.

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CLUTCHES

Detroit Diesel Appointments

Charles W. Frederick

Clyde W. Truxell, Jr.

Appointments of Charles W. Frederick as director of engineering and Clyde W. Truxell, Jr. as works manager at Detroit Diesel Engine Division of General Motors have been announced by Semon E. Knudsen, division general manager. Mr. Frederick, who has been an assistant chief engineer of Chevrolet Division since 1952, replaced Laurence S. Sheldrick, who was named by Mr. Knudsen as technical assistant to the general manager. Mr. Truxell, director of engineering and manufacturing for Allison Division's Aeroproducts operations since 1953, replaced Albert F. Davis, who became director of engineering and manufacturing at Diesel Equipment Division of GM in Grand Rapids. All appointments were effective June 1, 1955.

Albert F. Davis

Mr. Frederick first joined General Motors as a research engineer in 1923 after graduating from the University of Michigan. He had been with Chevrolet since 1932 serving as truck engineer, design engineer and chief aviation engineer prior to becoming assistant chief engineer in charge of production engineering for domestic and defense work and field service engineering.

Mr. Truxell joined General Motors in 1932 as a designer in the power plant section of the GM Research Laboratories Division. He became chief engineer of Detroit Diesel Engine Division in 1938 and later became chief inspector and superintendent of injectors. In 1944, he became director of engineering and sales for GM's Diesel Equipment Division in Grand Rapids, and was transferred to Aeroproducts operations in 1953.

Industrial Advertising Manager

Arthur E. Thode

Arthur E. Thode has been appointed industrial advertising manager for the Tractor Division, Allis-Chalmers Manufacturing Company, Milwaukee. He started with the company in the Tractor Division's office in 1929. He subsequently advanced through the Division's various departments. He gained practical sales field experience with an Allis-Chalmers industrial dealer and later was in the manufacturing department at West Allis, Wis., Works. During World War II he was on leave to the company's Supercharger plant as assistant to the chief inspector. He returned to the Tractor Division in 1945 as editor of "Timber Topics," external house organ. More recently he has been supervisor of industrial sales literature. Mr. Thode is a member of the Milwaukee Industrial Marketing Association and the Construction Equipment Advertisers.

Licenses Italian Firm

A licensing agreement to build certain types of Cooper-Bessemer compressors in Italy has been made public by Gordon Lefebvre, president of the Cooper-Bessemer Corporation, Mount Vernon, Ohio. The agreement, explained Mr. Lefebvre, gives Termomeccanica Italiana of La Spezia, Italy the license to manufacture current model Cooper-Bessemer type GMXA and GMVA, V-angle engine driven compressors. In addition, Termomeccanica may manufacture Cooper-Bessemer type EM, FM and JM motor-driven compressors.

Both engine-driven and motor-driven compressors are manufactured for sale on the Italian mainland. A similar licensing agreement was made in 1950 with Harland and Wolff, shipbuilding and manufacturing concern in Belfast, North Ireland. The licensing of Termomeccanica Italiana has been signed with the full agreement of Harland and Wolff.

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Sales Office: 14820 DETROIT AVENUE, CLEVELAND, 7, OHIO.

AP 174-1a

Florida Diesel News

By Ed Dennis

PAN AMERICAN World Airways, which operates the Guided Missile Test Range at Patrick Air Force Base in Cocoa, and at various stations in the Bahama Islands, received a six kw model Fairbanks-Morse 10½ hp generating set.

THE FLORIDA EXPLORER, a 67-ft. trawler recently launched by Diesel Engine Sales of St. Augustine, is powered by a General Motors model 6-110 diesel with GM power take-off and r&r hydraulic gears plus a 3 kw Onan generating set; for the Marin Co. of Tampa. Its sister ship, the *Alantic Explorer*, is reported to have set a world's record by returning from the Campeche shrimp beds with a load of 296 boxes of pink gold.

AT PRINCETON, Virgil Sanders took delivery of a D8 Caterpillar diesel tractor and the Hooper Construction Co. received a #12 Caterpillar road grader. Both from Shelley Tractor & Equipment Co. of Miami.

THE YACHT *Sleepy La Goon II* owned by Fuller E. Gallaway, Jr. of La Grange, Ga., had a pair of model D1x6-EC Hercules diesel engines installed. They are rated at 150 hp. Capt. Hall is skipper; engineered by Auto Marine Engineers of Miami.

AT ST. AUGUSTINE Ice Co., a 3 cyl. model 32E12 at 150 hp plus another Fairbanks-Morse generating set rated at 300 hp is supplying about 100 tons of ice daily. Sterling compressors and Madison-Kipp lubricators.

THE LUMMUS Cotton Gin Co. of Columbus, Ga. took delivery of a model 48 A. G. 4½ Fairbanks-Morse diesel generating set rated 40 hp with an F.M. 20 kw generator.

FLORIDA GEORGIA Tractor Co. of Miami, delivered to Blyth Bros., 5 Gallon road rollers powered with U.D. 350 International diesel engines for use at the newly activated Homestead Air Force Base, Homestead.

RECENT General Motors diesel installations included a 6-71 in a drag line at Sunniland, a 3-71 in a ¾-yd. unit dragline for Andy's Trucking Service at Hialeah and two 6-110's for the palatial 112-ft. *Cosa Grande* of Daytona Beach.

A BUDA DIESEL model 6-D.C.G. 770 was installed as a standby in the new Coral Gables sewer disposal plant to supply power for the 100 kw Allis-Chalmers generator.

UP AT DANIA, R. L. Shumaker received a Northwest #6 dragline powered with a model 20 Murphy diesel rated 150 hp at 1200 rpm. Florida Georgia Tractor Co. also delivered a similar model to Yelviengton & Perko of Miami.

IDEAL CRUSH STONE CO., west of Medley, had a 35x12 pusher type tug delivered via truck to their rock pit. Built by Dade Drydock on Biscayne Bay, it is powered with a D364 Caterpillar and has Snow Nabstedt 3:1 r&r gears.

ELLIS DIESEL SALES & Service of Ft. Lauderdale has informed us that they replaced the starboard gasoline engine on the 40-ft. *Mermaid II* of Hollywood, with a model 4-51 General Motors diesel, Paragon 2.5:1 r&r gears and will compare operating costs for 6 months with the port gasoline engine.

A 7 CYLINDER MODEL 38F5¼ Fairbanks-Morse 350 kw diesel generating set was sold to Markowitz Bros. Inc. of Miami.

CHARLES TOPPINO & SONS of Key West plans to have a model 3-268 General Motors diesel generating set with a 100 kw Westinghouse generator installed on their new dredge now under construction.

cut your diesel maintenance costs with

PUROLATOR

in these three spots

Even the cleanest fuel supply brings damaging dust, dirt and grit into your diesel engine. Without filtration, injection pumps gall, wear and lose their accuracy. Nozzles get plugged and burn. Even if your engine goes on running, the power output of individual cylinders goes badly out of balance.

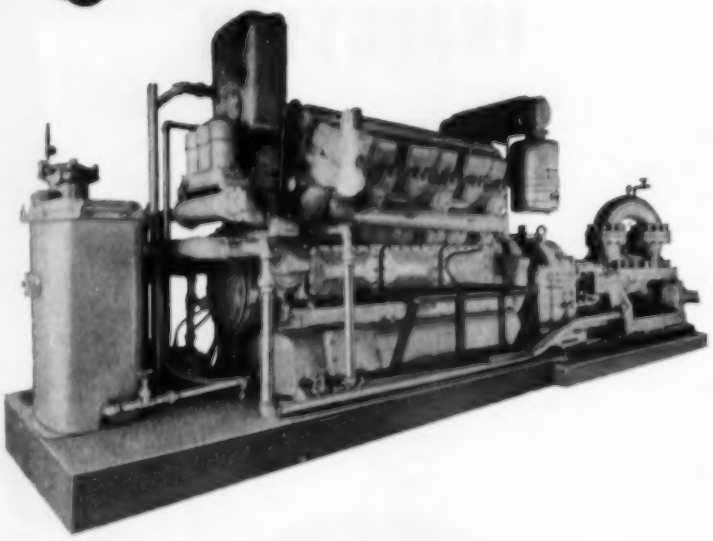
So . . . effective fuel oil filtration is absolutely essential. For your engine to keep running at peak efficiency and with minimum outlay for maintenance, its fuel system should be equipped with PUROLATORS in the three areas listed at the right.

For details of the PUROLATOR models designed for use in these diesel applications, write today for the PUROLATOR diesel catalog. Address Purolator Products, Inc., Rahway, N. J., Dept. DPI-810.

Immediately before and after the transfer pump. The PUROLATOR on the suction side protects the pump. The one on the pressure side takes out any bits of metal worn from the moving pump parts.

In the fuel line before the injection pump. A PUROLATOR here is an inexpensive way to assure smooth, wear-free operation of the injection pump.

Built into each injection nozzle. While there is no obvious source of contamination beyond the injection pump, experience shows that an individual metal-edge filter element built into each nozzle assembly vastly improves nozzle life expectancy.



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"FIRST IN THE FIELD OF FILTERING"

PUROLATOR PRODUCTS, INC., Rahway, New Jersey

Inland River Reports

By A. D. Burroughs

THE *Little One,* a new 105 hp towboat equipped with a Superior engine, has been acquired by Mid-West Navigation, Inc., to propel the popular St. Louis excursion barge, *Thunderbird.* She takes over for *Paulelah,* which sank during a recent violent thunderstorm.

EXCELLENT LAUNCHING pictures have arrived from Morgan City of the new neat-looking *Idaho.* Launched by Sam Carline, Inc., this new 34-ton steel hull tug measures 48 x 14½ feet; rated 315 hp from a Caterpillar engine.

IT IS INDEED good news to know that one of our favorites, the *Seneca,* is being repaired by her owners, the Vicksburg Towing Company. Equipped with Cooper-Bessemer engines rated at 1200 hp, this boat sank recently when hitting an underwater obstruction in the Tennessee River.

ANOTHER OLDSTER, known as the steam tug *Jeka,* has been rebuilt, repowered and rechristened the *Tipperary* at Calumet Shipyard and Dry Dock Company in Chicago. Owned by W. J. Meagher and Sons, Inc., this boat is complete with all new super-structure and new power from GM (Detroit) 6-110 Tandem-Twin diesel engines.

ENTHUSIASM REIGNED high as the Ohio River Company's new towboat, *A. L. Long,* made the third of a series completed by St. Louis Ship for this company. This new one is expected to live up to the fine reputation set by the first two in the series, *A. H. Crane,* and the still-new *Mike Creditor,* all powered by Baldwin-Lima-Hamilton engines.

ON THE UPPER OHIO, the newly painted *Hardy L. Roberts,* operated by Hardy L. Roberts, Inc., was in top form northbound with four barges of oil and one empty. Built in 1948 by Maxon Construction Company, she is equipped with General Motors engines rated at 1600 hp.

NOTING THE U. S. towboat *Robert G. West* upbound with her rated 640 hp developed from Caterpillar D386 diesels, we are reminded that the U. S. Army Corps of Engineers have recently celebrated their 180 birthday. This boat was named for the Chief Technical Assistant U. S. Engineer, Ohio River Division, who died in 1953.

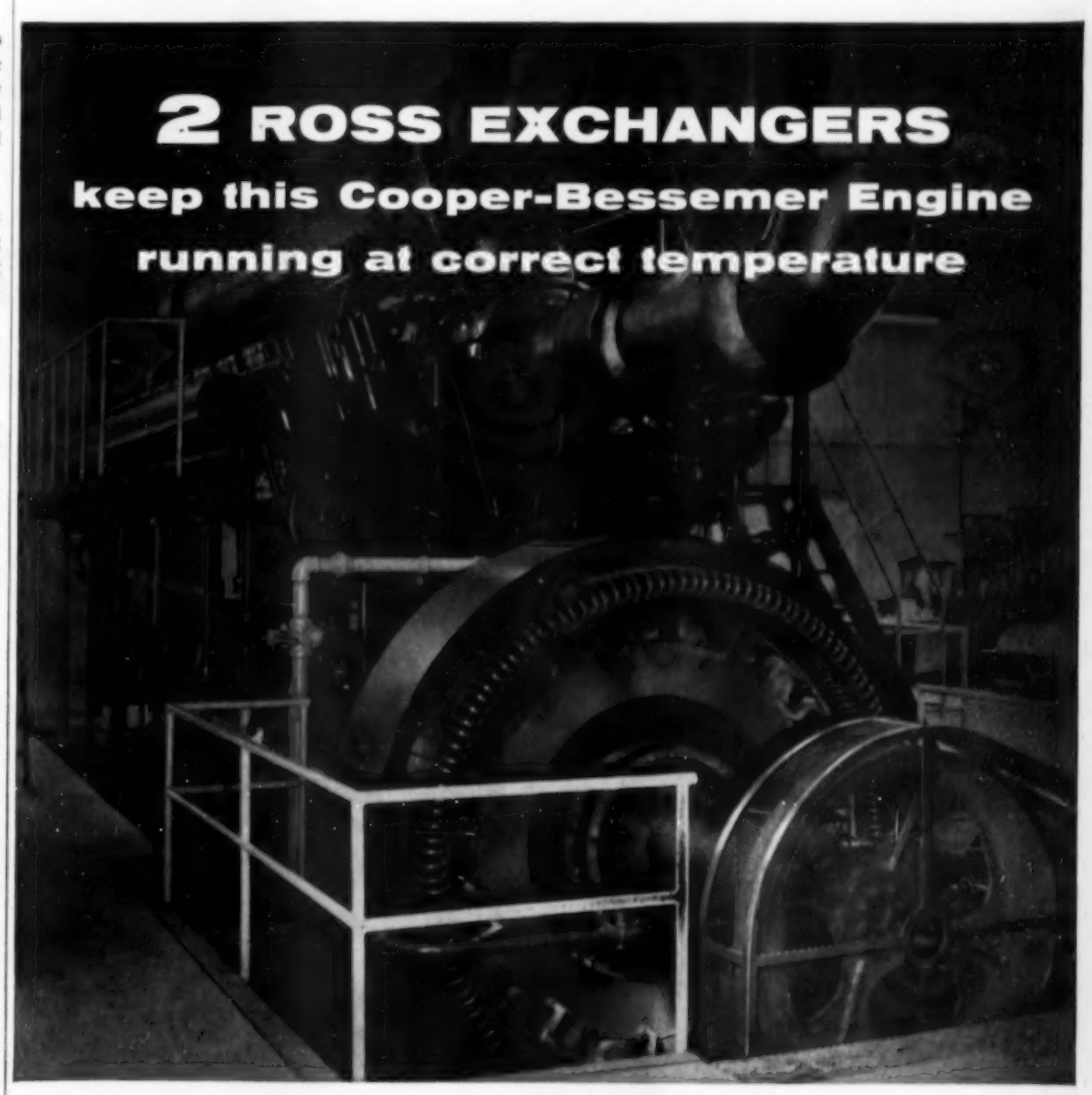
WE SPOTTED THE *B. F. Fairless,* owned by U. S. Steel Corp., and powered by Superior 8 cyl. diesel engines totaling 1066 hp near Pittsburgh with six barges of coal.

SOON AFTER the *Fairless* came the *James E. Lose* also with six coal barges. A capable performer equipped with Fairbanks-Morse OP diesels totaling 1200 hp, and built in 1952 by Ingalls Shipbuilding Corporation, she is the second boat of the name. The original is now named the *Charles R. Cox.*

OVER ON THE Mississippi, we were fortunate to see the *Alice Ingram* making her first trip of the season on the big water. Owned by Ingram Barge Co., she uses GM Model 6-71 in quads for a total 1000 hp at 1400 rpm. She was one of the first inland river boats equipped with ac auxiliaries.

OUR OWN CAMERA caught some good pictures of the *Lucinda Clark* near Greenville. Now owned by Badgett Construction Co., she first saw service back in 1937. She is equipped with a Kahlenberg diesel engine rated at 400 hp.

THE POWERFUL 3600 hp *Bayou Lacomb,* owned by Oil Transport Co., was reported in this same area a few days before with engineers Embrasine and Rilke in charge of her F-M OP engines.



To meet the need for additional generating capacity, this big 16-cylinder Cooper-Bessemer dual-fuel engine was installed in the municipal power plant at Princeton, Illinois.

Furnished with it were two Ross Exchangers: One cools lube oil. The other cools jacket water. *Engine temperatures never exceed desired operating levels!*

Almost everywhere that diesel, gas or gasoline engines go, Ross Exchangers also go. Specified by users as well as engine builders, they are regularly selected for numerous types of prime equipment to cool air, oil, water and hydraulic fluid.

Such acceptance is the combined result of many factors: Thermal efficiency . . . Ruggedness . . . Compactness . . . and Standardization that makes a broad range of sizes promptly available . . . Plus, of course, cooperative Kewanee-Ross engineering service.

For more information, request Bulletins 1.1K5 and 2.1K5.

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Mid-Continent Diesel News

By **Jack F. Cozier**

PIPELINE SERVICE CO., Seminole, Okla., has purchased a Caterpillar D8 150 hp tractor mounting a 60 yd. CFI Joy rear mounted air compressor with two 10 ft. hydraulic jibs for pipeline work. The unit was sold by Butler-Sparks Equipment Co., Tulsa, Okla.

FROZEN FOOD EXPRESS, Dallas, Tex., has bought four International RDCF-405 trucks powered by Cummins 200 hp diesel engines. These units, delivered by International Harvester Co., Dallas, Tex., are equipped with tandem rear ends and roadranger transmissions.

LUHR BROS., Inc., Columbia, Ill., have taken delivery on a Winter-Weiss Portadrill powered by a Buda 6DT-317 diesel engine sold by Arrow Engine Sales & Service, Inc., St. Louis, Mo.

BRADEN DRILLING CO., Wichita, Kan., has ordered a GM (twin 6-110) unit through Mountain Iron & Supply Co.

HOOVER EQUIPMENT CO., Caterpillar dealer in Oklahoma City, Okla., is holding a school for employees of Twin Disc torque converters. The converters are optional on Caterpillar D8 and D8 tractors.

SQUIRE ELECTRIC CO., Kansas City, Mo., purchased a 6-71 GM diesel to power a 60 kw Kato generator for standby power at the St. Mary's Hospital in Kansas City. Unit was sold by K C Diesel Power Co., North Kansas City, Mo.

FRANK WHEATLEY Pump & Valve Mfr., Tulsa, Okla., obtained a Buda 6MO-893 gas engine to power a Wheatley pipeline pump for delivery in Western Nebraska. The sale to Wheatley was made by Buda Engine & Equipment Co., Tulsa, Okla.

J. W. MOORMAN Construction Co., Muskogee, Okla., AGC contractors, has purchased a new Caterpillar D9 tractor (one of the first two in Oklahoma). The unit sold by McCormick Machinery Co., Tulsa, Okla., will be used for push-loading on the new northeast toll road near Big Cabin, Okla.

SOUTHEASTERN Construction Co., Tulsa, Okla., bought a 23TDT Euclid 15½ yd. scraper powered by a GM 6-110 diesel engine. The 30 hp unit sold by Butler-Sparks Equipment Co., Tulsa, Okla., will be used for dirt moving.

LEA COUNTY Electric Cooperative, Inc., Lovington, New Mexico, is purchasing two 2-cycle Nordberg TSGL-2112-31 generating units rated at 4000 kw each.

OKLAHOMA COUNTY, Okla., has purchased a Caterpillar D7 tractor with a hydraulic bulldozer from Hoover Equipment Co., Oklahoma City, Okla. The unit will be used for maintenance and shale pit work.

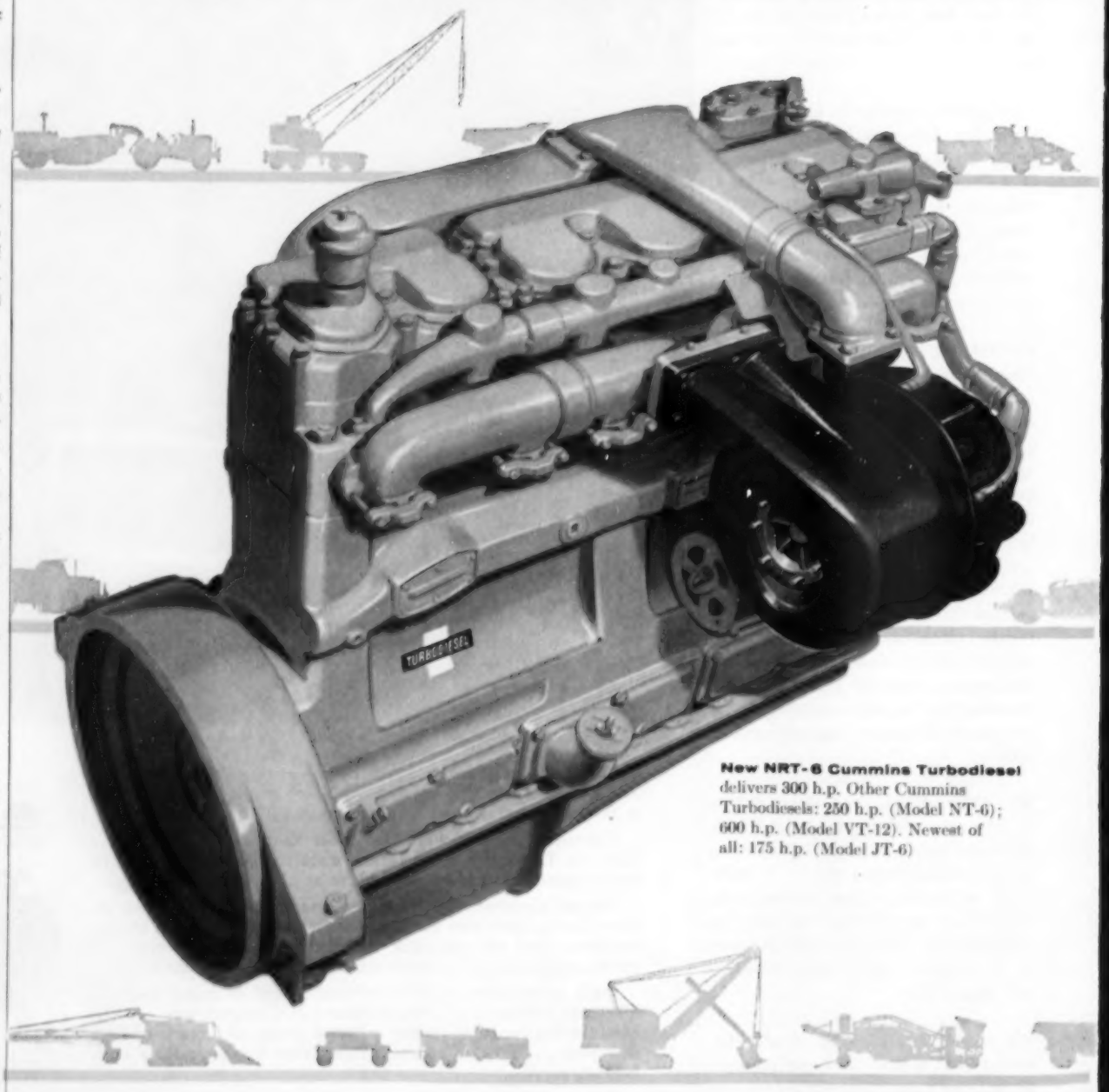
BETHLEHEM SUPPLY CO., Tulsa, has purchased two Buda 6MO-970 gas engines to power two Ajax reciprocating pumps for oil field work in West Texas. The sale was made by Buda Engine & Equipment Co., Tulsa, Okla.

T & O ROCK AND LIME CO., Sedalia, Mo., has bought a GM 4-71 diesel to power a Rogers 24x36 inch jaw crusher. The unit sold by K C Diesel Power Co., North Kansas City, Mo., has a Rockford power takeoff with a 1.76 to 1 reduction.

PALLESEN CONSTRUCTION CO., Oklahoma City, Okla., purchased a Euclid 14TDT dirt scraper powered by a Cummins NHS-600 diesel from Cummins Sales & Service, Oklahoma City, Okla., to be used for highway work.

Now available for all kinds of construction equipment...

New Cummins



New NRT-6 Cummins Turbodiesel delivers 300 h.p. Other Cummins Turbodiesels: 250 h.p. (Model NT-6); 600 h.p. (Model VT-12). Newest of all: 175 h.p. (Model JT-6)

TEXAS REFRIGERATED LINES has just purchased an International DC-405 two axle tractor. The unit is powered with a 180 hp Cummins HRBB diesel engine.

FRIX-FOSTER Construction Co., Muskogee, Okla., AGC contractor, has bought a new Caterpillar D9 tractor (one of the first two in Oklahoma) from McCormick Machinery Co., Tulsa, Okla. The unit will be used for push-loading on a highway project near McAlester, Okla.

BYRON-JACKSON CO., Tulsa, Okla., has purchased a Buda 6MO-970 gas engine to operate a centrifugal pump in Louisiana with the sale being made by Buda Engine & Equipment Co., Tulsa.

WARD MINES, INC., Lordsburg, New Mexico, has purchased a Unit 614 crane with a GM 2-71 diesel engine powering a Unit torque converter. The crane was sold by Midwestern Engine & Equipment Co., Tulsa, Okla.

PIPELINE SERVICE CO., Seminole, Okla., has purchased a Cleveland backfiller powered by a Caterpillar D318 diesel engine with the sale made by Leland Equipment Co., Tulsa, Okla.

SOUTHEASTERN Construction Co., Tulsa, Okla., has bought a Euclid 14-TDT 15½ yd. scraper with the power being provided by a 275 hp Cummins NHS diesel. The unit sold by Butler-Sparks Equipment Co., Tulsa, Okla., has a ten speed Fuller transmission.

STANNARD Construction Co., Wichita, Kan., has purchased a GM 4055C diesel to repower a Rex paver with the sale being made by Diesel Equipment Co., Inc., Wichita, Kan.

BETHLEHEM SUPPLY CO., Tulsa, Okla., has purchased two 4BD-153 Buda diesels to power utility pumps on a rotary to be exported. The sale was made by Buda Engine & Equipment Co., Tulsa, Okla.

SANTA FE RAILROAD, Oklahoma City, Okla., is converting a Brown type K steam hoist to diesel operation with a Caterpillar D-326 diesel purchased from Hoover Equipment Co., Oklahoma City, Okla.

CITY OF CUSHING, Oklahoma municipal light plant has purchased a 2500 kw generator driven by a LSV-16-GDT dual-fuel Cooper-Bessemer engine.

THE CITY OF TULSA, Oklahoma, has bought an IH TD-18 tractor with a bulldozer from the Clarence L. Boyd Co., Tulsa, Okla.

CHARLES COLYN, McPherson, Kan., is repowering a Chevrolet two ton series 6200 truck with a GM 4380S diesel sold by Diesel Equipment Co. ,Wichita, Kan.

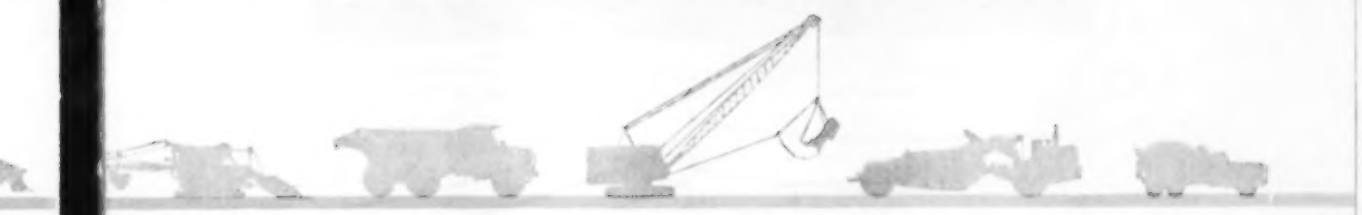
McMICHAEL Construction Co., Tulsa, Okla., AGC contractors, has purchased a Caterpillar D7 tractor and a Cat D2 tractor both with bulldozers. The units sold by McCormick Machinery Co., Tulsa, Okla., will be used on construction projects in Tulsa.

LA PORTE City, Iowa, Municipal Light Plant has just bought a Worthington SDRGO dual-fuel 840 kw electric set with an Electric Machinery Co. generator.

CITY OF HOMINY, Oklahoma, municipal light plant has just put into operation their tri-fuel JS8-GDT-SG Cooper-Bessemer engine.

COSMO Construction Co., Tulsa, Okla., has purchased two Euclid 15½ yd. 14TDT scrapers powered by Cummins NHS diesels. These 275 hp scrapers have ten speed Fuller transmissions and will be used for dirt moving. The sale was made by Butler-Sparks Equipment Co., Tulsa, Okla.

Turbodiesels



POWER!.....PERFORMANCE!.....PROFIT!

Here's a new power concept to make *your* construction jobs more profitable. Cummins Turbocharging brings you extra diesel horsepower without added engine weight by harnessing the energy in normally wasted exhaust gases . . . boosting engine efficiency.

Field tests on all kinds of construction jobs show significant savings in time, fuel and equipment. And like all Cummins Diesels, the new Turbodiesels feature the simple to understand and service PT fuel system and easy-as-gasoline maintenance. Added time-saving economy feature for construction men: special service and parts availability on job sites is arranged by your local Cummins distributor to serve *your* needs.

No wonder *more and more construction men today are standardizing on Cummins Diesels.*

CUMMINS diesels give you the big plus **MORE PROFIT**

Cummins Engine Company, Inc.
Columbus, Indiana

I am interested in finding out more about the advantages of Cummins Turbodiesels. Please send me:

_____Your directory of manufacturers offering Cummins Diesels in their equipment.

_____Your booklet illustrating Turbodiesel principles.

I am interested in converting my present equipment to Turbodiesel power.

_____Please have your representative call.

Name_____

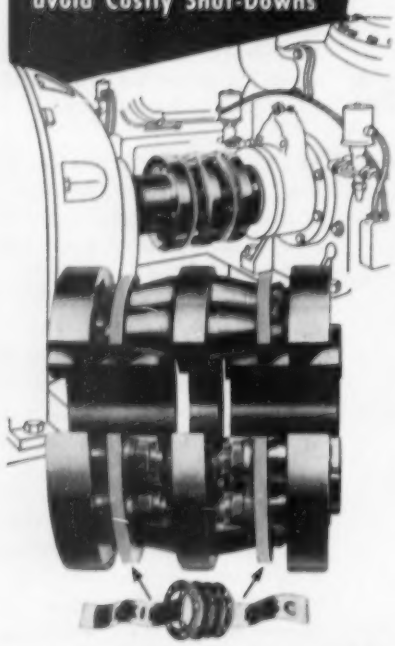
Position_____

Company_____

City_____ State_____

DP-8

Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs

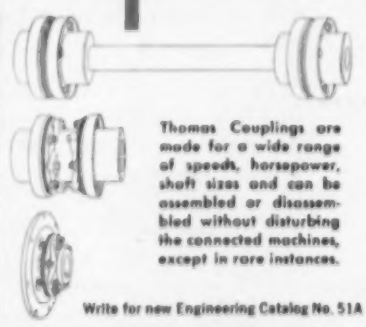


Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Typical Heavy Duty Application on Multiple V-Belt Drive

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

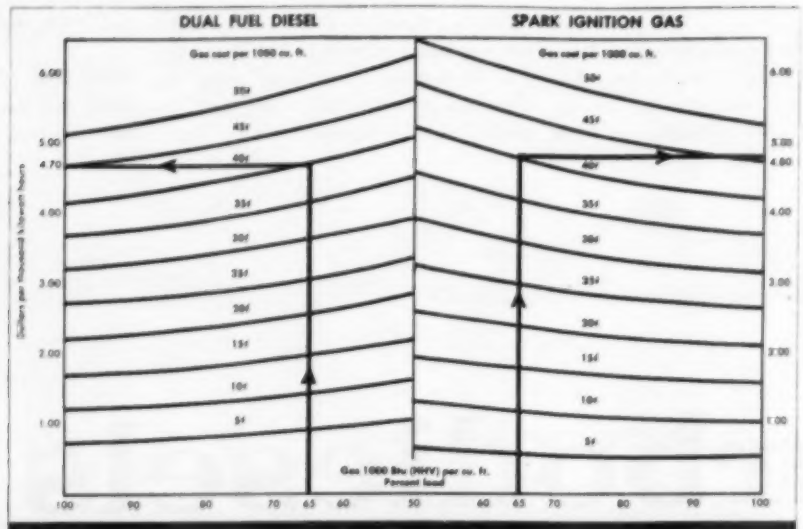
Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

FUEL COST CHARTS FOR ENGINE SELECTION

By Volney M. Holmes*

* *Assistant Manager, Engine Division, Worthington Corporation.*



ENGINEERS concerned with selecting the most economical type of engine for a given application will find these fuel-cost charts helpful. They compare the relative costs among oil diesel, dual-fuel diesel, gas diesel and spark ignition engines. In all cases, lubricating oil cost can be calculated by estimating lubricating oil consumption at 4000 rated horsepower hours per gallon.

Fuel costs for dual fuel diesel and gas diesel include 19,350 Btu (HHV) per pound of *pilot oil at ten cents* per gallon. For each cent that pilot oil varies from ten cents per gallon, add or deduct the following amounts to or from the costs shown per thousand kilowatt hours for dual fuel and gas diesels: (a) full load, 2.6 cents; (b) ¾ load, 3.4 cents; (c) ½ load, 5.0 cents.

Example: If diesel fuel oil is available at a price of 11 cents per gallon and natural gas at a price of 40 cents per thousand cubic feet, what is the best engine selection? The average load is assumed to be 65 percent of full load.

Solution: First, refer to the charts titled, "Dual Fuel Diesel" and "Gas Diesel." Follow the arrows and the cost of fuel oil is found to be $4.70, based on pilot oil at 10 cents per gallon. For 11 cent pilot oil, the total correction will be plus 4 cents. Therefore, the total cost of gas and pilot oil per thousand kilowatt hours will be $4.70 + .04 = $4.74. The "Spark Ignition Gas" chart shows that fuel for this engine at 65 percent load factor is $4.80.

Similarly, referring to the 'Oil Diesel" chart, oil for this type of engine costs $7.85. In this instance, the dual fuel diesel, generating power at a cost of 4.74 mils per kw-hr., is the best selection. Not only is the fuel cost less, but in case of gas failure, it can be changed over instantly to operation on 100 percent oil. When equipped with automatic changeover devices, the engine will automatically go from gas to oil under load.

If oil costs 8 cents per gallon and gas is 20 cents per thousand cubic feet, comparative fuel costs per thousand kilowatt hours are as follows:

Dual Fuel $2.55 − (4×.02)	= $2.47
Spark Ignition	= $2.40
Oil Diesel	= $5.70

In this instance, the spark ignition engines produce the lowest fuel cost by a slight margin compared to dual fuel.

If gas at this price of 20 cents per thousand repre-

sents a dumpload rate, then consideration should be given to either a dual fuel or a tri-power engine. In this case, the final decision will depend upon other factors that may be evaluated in addition to the cost of fuel.

It will pay to check local fuel costs. If you are not now using the most economical fuel in your engine, it may be converted to a lower priced fuel for additional savings.

LOMA Annual Meeting

The Locomotive Maintenance Officers' Association will hold their annual meeting September 12 through 14 at the Hotel Sherman in Chicago. The meeting should prove of exceptional interest inasmuch as no meeting was held last year. Developments in the railroad field over the past two years provide an excellent background for the discussions of the coming meetings.

It is anticipated that representation by the various roads will be larger than ever because of the meeting's contents. A large variety of pertinent and important subjects will be covered in the three days of sessions. They will include The Foreman Problem, Present and Future; Power Assemblies and Bearings; Repairs and Reclamation of Diesel Parts in Railroad Shops; Fullest Possible Use of Existing Shop Facilities; Control of Electrical Delays and Ground Relay Action; Diesel Axle, Wheel and Truck Maintenance; The Effects of Oil in Water and Recommendations to Eliminate It; Good Inspection Means Good Maintenance; and A Positive Electric and Mechanical Diesel Maintenance Program.

Purchases Intercontinental

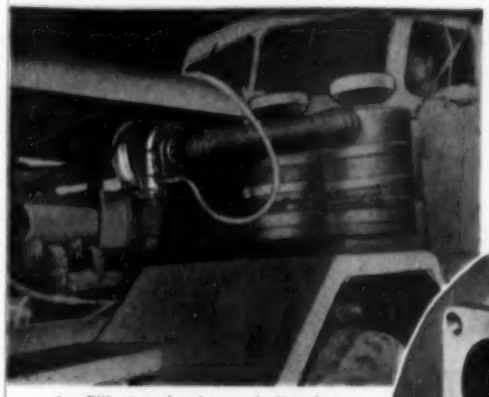
The United States Hoffman Machinery Corporation has purchased the Intercontinental Manufacturing Company, Inc., at Dallas, Texas. Purchase of Intercontinental was made in keeping with the company's planned program for expansion and diversification of its sales and manufacturing activities, according to Hyman Marcus, company president. Intercontinental manufactures tractors, farm implements, buses, motor coaches and industrial equipment and machinery in addition to aircraft components. The Texas company operates two plants. Its main plant in Garland is five miles northeast of Dallas and occupies 180,000 square feet of floor space on a 23-acre tract. Its Brady, Texas plant has a manufacturing area of 200,000 square feet. It is located on 524 acres of land along with Intercontinental's privately owned Curtis airport. Intercontinental will continue its activities under the direction of its executive vice-president, Ray Shape, according to Mr. Marcus.

Uruguayan Locomotives

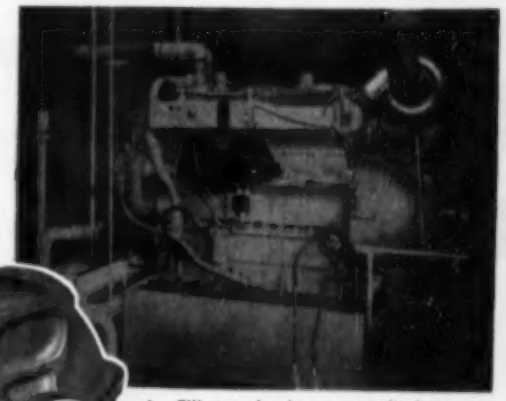
Uruguay's final installment in its rail motive power modernization was realized recently with the arrival of the 64th locomotive from the United States for operation on the Uruguayan State Railways. Sixty-one of the locomotives were built by the General Electric Company. The new diesel-electrics are replacing 45-year-old oil-burning steam locomotives. During the first year of operation, the diesel-electrics then in service showed a five to one fuel advantage over the steam locomotives. Fuel capacity of the new units is sufficient to enable them to make the longest scheduled round trips without refueling.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

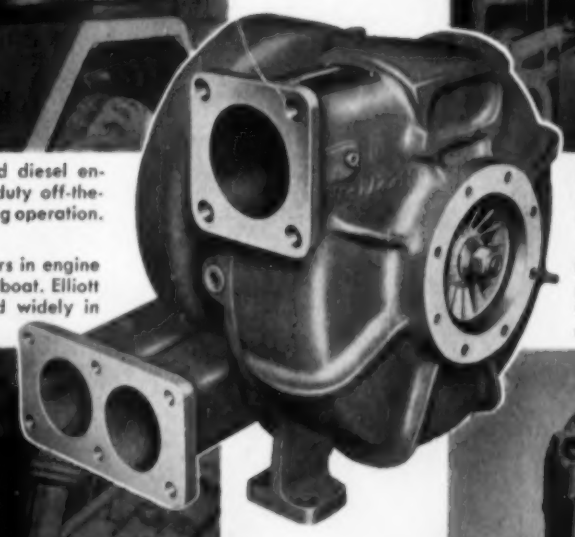
You can count on ELLIOTT turbocharging!



An Elliott turbocharged diesel engine used in a heavy-duty off-the-highway truck in a mining operation.

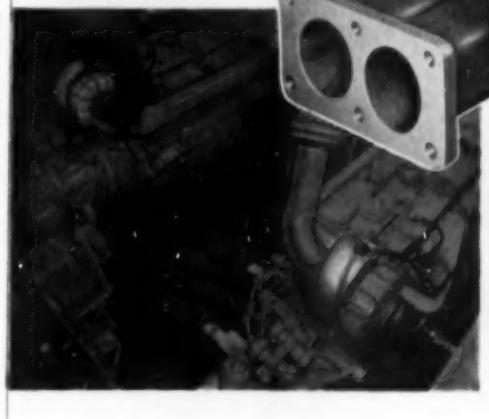


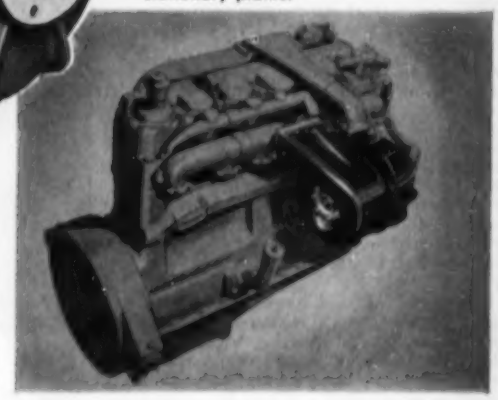
An Elliott turbocharger applied to a diesel engine in an industrial pumping installation.



Two Elliott turbochargers in engine room of a powerful towboat. Elliott turbochargers are used widely in marine service.

Elliott turbochargers also boost output of high-speed engines like this for truck, marine, locomotive and stationary plants.



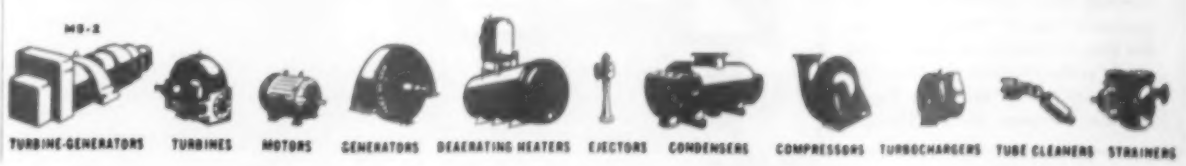


Back of today's Elliott turbochargers...

... are 15 years of design, manufacturing and application experience with over 12,000,000 hp of turbocharged engines! These turbochargers are piling up thousands of operating hours on the toughest kinds of service—on heavy-duty on-and-off-highway trucks, railroad locomotives, oil-well drilling rigs, drag lines, power shovels, marine and stationary installations. When your diesel engine is equipped with an Elliott turbocharger you can count on it to deliver the trouble-free performance and high operating standards required.

Get full information on Elliott exhaust-driven turbochargers for four-cycle or two-cycle engines. Specify them on your next engine, whatever the application. Elliott Company, Supercharger Dept., Jeannette, Pa.

ELLIOTT Company



Gulf Coast Diesel Notes

By Michael T. Pate

ZAPATA OFFSHORE Company, Houston, has secured 8 series 110, model 12-2403 GM diesels, rated at 400 hp each, the engines to be used to form the power plant for an offshore drilling rig. The engines were furnished by Stewart & Stevenson Services, Inc., of Houston, three being ordered by National Supply Company, Houston, and five by Oilwell Supply Company, of Houston.

CONTINENTAL SUPPLY Company of Texas, Dallas, has bought from the Diesel Division, Fairbanks, Morse & Company, three 7-cylinder model 38F90 drilling engines which will be used to power drawworks and mud pump on a drilling rig.

WILLIAM ANDERS, Dickinson, Texas will power his 75-foot new wooden shrimp boat with a 260 hp series 110 GM diesel marine propulsion unit equipped with 4½:1 hydraulic reduction and reversing gear. The unit was sold and installed by Stewart & Stevenson Services.

GEORGE BURKE, SR., of Bay City, Texas, has bought from Mustang Tractor & Equipment Company, Houston, a Caterpillar diesel delivering 154 hp at 1200 rpm. The diesel will power a deep well irrigation pump.

TEXAS GULF SULPHUR COMPANY, Houston, has taken delivery from Stewart & Stevenson Services, Inc., of a series 71, enclosed type GM diesel engine unit, rated at 130 hp. The diesel will be used in the company's sulphur mining operations in Mexico.

PURE OIL COMPANY, Houston, has bought another Stewart & Stevenson model 3GD30 ac generating set powered with a GM series 71 diesel. The unit will be used as primary power on an offshore production platform.

PRECISION GRINDING & Bearing Company, Corpus Christi, Texas, has secured from Waukesha Sales & Service, Inc., Houston, a model 148DKU Waukesha diesel delivering 150 hp at 1400 rpm. The company also bought a model 180DLCU Waukesha diesel rated at 33 hp at 2000 rpm. Both units will furnish primary power in the company's expanded plant operation.

HARRY L. EDWARDS Drilling Company, Houston, through Continental Supply Company, has purchased from Stewart & Stevenson Services, Inc., a series 71, Quad 6 GM diesel. The 520 hp engine will go on the drilling company's offshore barge now being equipped.

WESTERN CONSTRUCTORS, pipeline contracting firm at Athens, Georgia, has bought from Big 3 Welding & Equipment Company, Houston, 6 Lincoln ac welding units, each rated at 300 amps and powered by a GM diesel.

CITY OF ROBSTOWN, Texas, has secured through Stewart & Stevenson Services, Inc., a General Motors Electro-Motive powered 1000 kw ac generating set as an addition to its municipal light plant. The engine is an EMD dual-fuel unit.

CLEGG & HUNT, drilling contractor of Houston, has purchased through Houston Engine & Pump Company a model 124 Murphy diesel rated at 225 hp, which will furnish auxiliary power on one of the company's oilwell drilling rigs.

CATE EQUIPMENT Company, Salt Lake City, Utah, has secured from Stewart & Stevenson Services, Inc., a Stewart & Stevenson model 12GD175S ac generating set complete with switch gear and oilfield type skid base. The unit, powered by a series 71, twin-6 direct-connected GM diesel, will be used in the

Young Heat Transfer News

YOUNG RADIATOR COMPANY, RACINE, WIS.

Utility Cools Compressed Gas with Young Atmospheric Radiators

These three methods are: (a) conduction, (b) convection and (c) radiation.

Heat transfer by conduction exists when heat flows within a body from one region of high temperature to another region of lower temperature by simple molecular communication. The amount of heat which can be transferred by conduction is dependent on the temperature difference, thermal conductivity of the material through which the heat is being conducted, the distance between the hot source and the cold sink, and the cross sectional area for heat flow.

Transfer of heat by forced convection depends on the velocity of the fluids over the surface through which heat is conducted . . . by the shape of the surface, by the area through which heat is conducted . . . and by various properties of the fluid as well as temperature difference.

The third general means of heat transfer is radiation. Here heat flows from the body of the higher temperature to the body of the lower temperature through space without any medium within the space. For further details on this subject write for free bulletin: "Heat: Forced Convection Removal From Industrial Hydraulic Circuits" to Young Radiator Company, Dept. 405-B, Racine, Wis.

Young Radiator Company "HC" Cooler and Condenser.

Southwest Natural Gas Company, Ada, Oklahoma, uses Young Radiator Company HC* Horizontal Core Cooler to cool compressed gas stored underground during the summer. Gas is withdrawn during the peak winter loads to supplement pipeline capacity into the City of Ada and nearby points.

Cooling is necessary because higher temperatures are detrimental to the porosity of the formation underground into which the gas is stored.

In addition compressors inside the building are equipped with Young Radiator Company "Mono-Weld" Jacket Water Coolers.

These efficient "HC" Units are also used for cooling water, oil and other gases and for condensing steam and vapors. They combine the efficiency of vertical air discharge with the economy of compact Young design . . . and the versatility of multiple unit combinations. Cooling cores are available in plate fin, Monofin or spiral fin construction for any operating pressure. Fans are mounted independently on special tripods completely eliminating vibration, a major cause of core failure. For full details on "HC" cooling units see your nearest Young representative or write Young Radiator Company, Dept. 405-H, Racine, Wisconsin.

* HC is a Young Radiator Company trademark.

NEW FIXED TUBE BUNDLE HEAT EXCHANGER CATALOG

A complete description of stock and specially engineered Young Radiator Company Type "F" Fixed Tube Bundle Heat Exchangers is given in the newly revised Catalog No. 1254. For your copy, write Dept. 105-H, Young Radiator Company, Racine, Wis.

Young RADIATOR COMPANY

RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS FOR INDUSTRY

Heat Transfer Products for Automotive, Aviation and Industrial Applications. Heating, Cooling, Air Conditioning Products for Home and Industry.

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

company's mining operation at Austin, Nevada.

PIERCE RANCH, Wharton, Texas, has bought through the Diesel Division, Fairbanks, Morse & Company, two 5-cylinder model 38D8⅛ diesels which the company will use in its operations in and around Wharton.

COMPANIA MINERA de Huchutenango, Houston, Texas, has bought for its lead mine in Guatemala three Stewart & Stevenson ac generating sets. The 125 kw generators are each driven by a GM diesel, series 110.

EMSCO MANUFACTURING Company, Houston, has secured for a drilling rig it has under construction two Waukesha model 6LRDBU Waukesha diesels, each rated at 375 hp when turning up 1200 rpm. The sale was made by Waukesha Sales & Service, Inc., Houston.

SUTTON DRILLING Company, San Antonio, Texas, has secured through Houston Oil Field Material Company a series 71, diesel unit equipped with torque converter. The General Motors diesel will furnish auxiliary power on an oilfield drilling rig.

ASSOCIATED PIPELINE Contractors, Inc., Houston, has bought from Big 3 Welding & Equipment Company, Houston, two 300 amp Lincoln electric welding generators, each powered by a GM diesel.

SUPERIOR OIL Company, Lake Arthur, Louisiana, has bought a Stewart & Stevenson model 4GD40 ac generating set, powered with a General Motors series 71 diesel. The unit will be used in oilfield lighting service.

Order For 440 Buses Placed

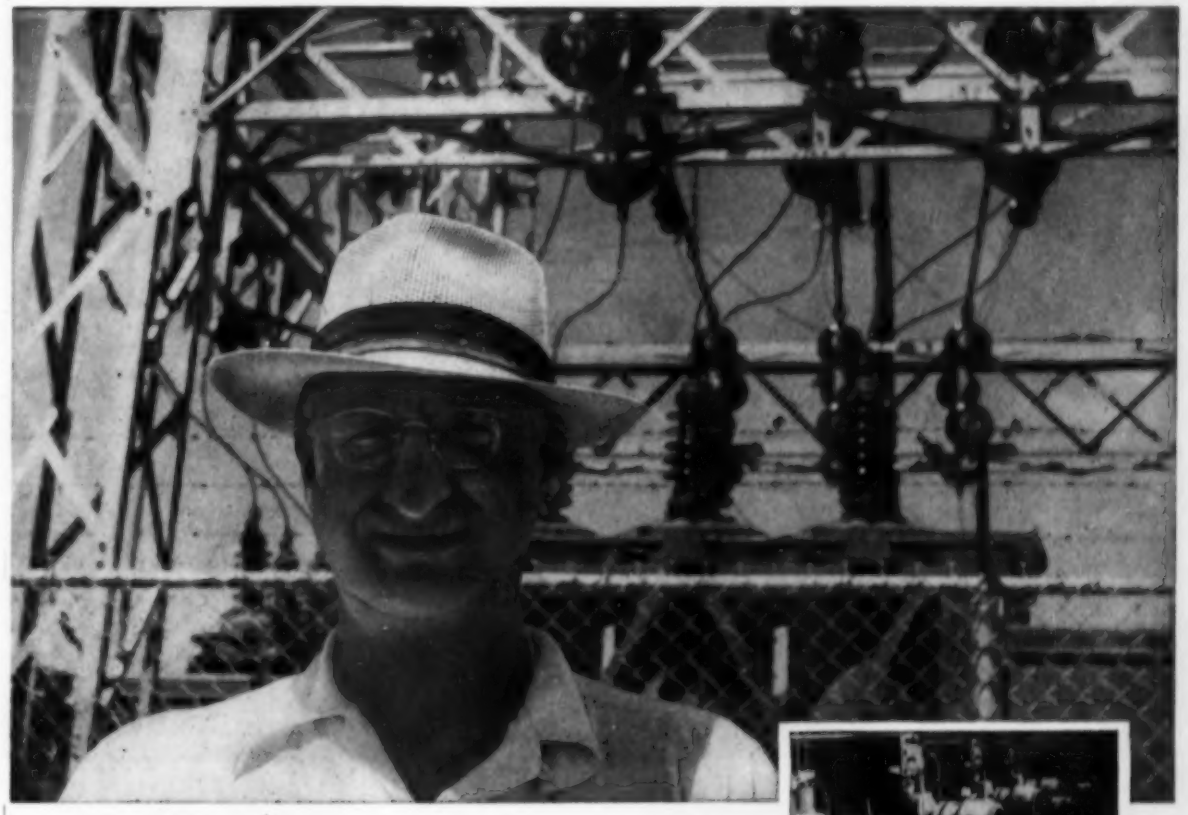
Modernization of San Francisco's surface transportation system received a boost when a 9-million-dollar order for 440 48-passenger Mack buses was awarded by the City and County of San Francisco. Powered by Mack's turbocharged diesels, with torque converter drive and suspended on air springs, the buses are of light weight design, with 102-in. width for maximum passenger comfort.

Deliveries, which will start in the fall, will be spread over a period of five years, 100 being scheduled for this year. This is one of the largest bus purchases made by any city since World War II.

Among the many features which will be incorporated in these vehicles for maximum passenger comfort and convenience are: headroom from 81⅛ in. at the front to 76 in. at the extreme rear; pressure ventilation; all-welded unified body and chassis frame construction; and hydraulic power steering. The power plant is suspended at three points at the rear, with an 18-degree backward inclination of the engine and a 52-degree angle drive from the transmission to the rear axle.

Basically the well-known Mack Thermodyne diesel, the engine is provided with an exhaust-driven Schwitzer-Cummins supercharger and delivers 205 hp at 2100 rpm and 560-lb./ft. torque at 1500 rpm. It is of the air-swirl, open-chamber, direct-injection type, of 672 cu. in. piston displacement, with 16.59-to-1 compression ratio, employing American Bosch injection equipment. Its six cylinders are of 4⅞ in. by 6 in., bore and stroke.

To meet the severe requirements of San Francisco's 19-per cent grades on some routes, while providing adequate speed and economy in the less-hilly sections, a part of the fleet will be provided with higher numerical rear axle ratios than the balance. Also, to negotiate the narrow streets and sharp corners to be found in the older parts of San Francisco, a turning radius of 35 ft. will be achieved by the wide, 86-in. front tread.



POWERFUL GUY!

His four Nordberg Diesels, lubricated by Cities Service DC-940 Oil, supply six Oklahoma Counties with REA power. Have one of lowest cost-per-KWH records of entire REA.

His name's H. P. Wingo, and he's Chief Engineer of the REA plant operated by Western Farmers Electric Cooperative.

For the past four years, since his plant began operation in Woodward, Oklahoma, he's been responsible for a consistently high power efficiency rating, measured in cost per kilowatt hour...as high as fifth among all 42 REA plants! To maintain this record, he's had important help... help from four 1100 KW Nordberg dual-fuel engines...and help from Cities Service DC-940 Oil.

"Our engine compressions are the same today as they were after the first three months' operation," says Wingo. "In addition, using Cities Service DC-940, rings have remained absolutely free, liners have worn less than .0015, and we average 14,000 horsepower hours per gallon of oil. Filter elements last up to 1,500 hours."

Wingo has added his words of praise to those of scores of other users of Cities Service Lubricants. Summed up, these reports clearly demonstrate that superior performance is not the exception, but the rule, with Cities Service products. Your Cities Service Lubrication Engineer can readily explain why. Talk it over with him. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

4 NORDBERGS, 4 YEARS OLD... yet engine compression remains the same as after first three months of operation at Western Electric REA Plant, Woodward, Okla. Rings "absolutely free," liners worn less than .0015, oil consumption at 14,000 H.P. hrs. per gallon using Cities Service DC-940 Oil.

CLOSE CHECK is kept on entire operation. Meanwhile, Cities Service Lubrication checks wear in Nordberg engines, helps engineer Wingo maintain record of low cost electricity. Supplying economical power to six Oklahoma Counties, plant's power efficiency rating has been as high as 5th in entire REA.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

West Coast Diesel News

By James Joseph

PETER KIEWIT SONS' Co. is operating a Madsen Model 481 asphalt plant complete with Madsen dryer and dust collector unit in Alaska. Madsen batchers are powered with a Caterpillar D-356 generating unit in combination with a D-17 Caterpillar diesel on the pugmill mixer only. A D-318X Caterpillar powers the Madsen 380 dust collector.

J. W. FISHER has taken delivery of a 6DA-844 Buda diesel for powering his log truck, working the Willow Creek, Calif. area.

PORTLAND'S Nelson Equipment Co. has sold a LeTourneau Electric Logging Arch (with model 6DAS-844 Buda diesel) to Raines Lumber Co., Brookings, Oregon. Other lumbering firms which have recently bought the electric logging arch are Tyler & Adkins, Crescent City, Calif. and Pilot Rock Lumber Co., Pilot Rock, Ore.

BOISE-WHITE Truck & Equipment Co., Boise, has been appointed distributor for all lines of Buda lift trucks, shop mules, and chore boys, in Idaho.

TO FLUORITA DE MEXICO, Coahuila, Mexico, a Fairbanks-Morse model 38D8⅛, 960 hp diesel engine—the sale announced by Fairbanks-Morse's diesel division manager, C. E. Dietle.

FOR COKEVILLE, Wyoming's E. H. Jackson, a 2-cylinder, 58 hp Fairbanks-Morse model 49B4½ power unit.

DELIVERED to C. E. Leesburg, Myrtle Point, Oregon, a White logging truck powered with a 6DAS-516 Buda diesel.

FOR NATIONAL Steel & Shipbuilding Corp., San Diego, a Fairbanks-Morse 960 hp, model 38D8⅛, 720 rpm marine engine, for installation aboard an abuilding vessel.

ROGERS CONSTRUCTION and Babler Bros., operating in Alaska, are working a Madsen model 481 asphalt batch plant powered with a Caterpillar D-397 diesel generating unit.

SPOKANE PUMP and Pipe Co. has taken delivery of a 3-cylinder, Fairbanks-Morse 90 hp, model 49B4½-18 diesel power unit.

FOR STANDBY emergency pumping at Larsen Air Force Base, Moses Lake, Wash., four 8MO-1290 Buda pumping units (sold through Allis-Chalmers Mfg. Co., General Machinery Division). Servicing is being done by Portland's Hamilton Engine Sales, Inc.

FOR RAFAEL PAREDED Y Cia, Ltda, Colombia, two Wagner tractors, one powered by a Buda 6DA-516, the other by a 6DT-468.

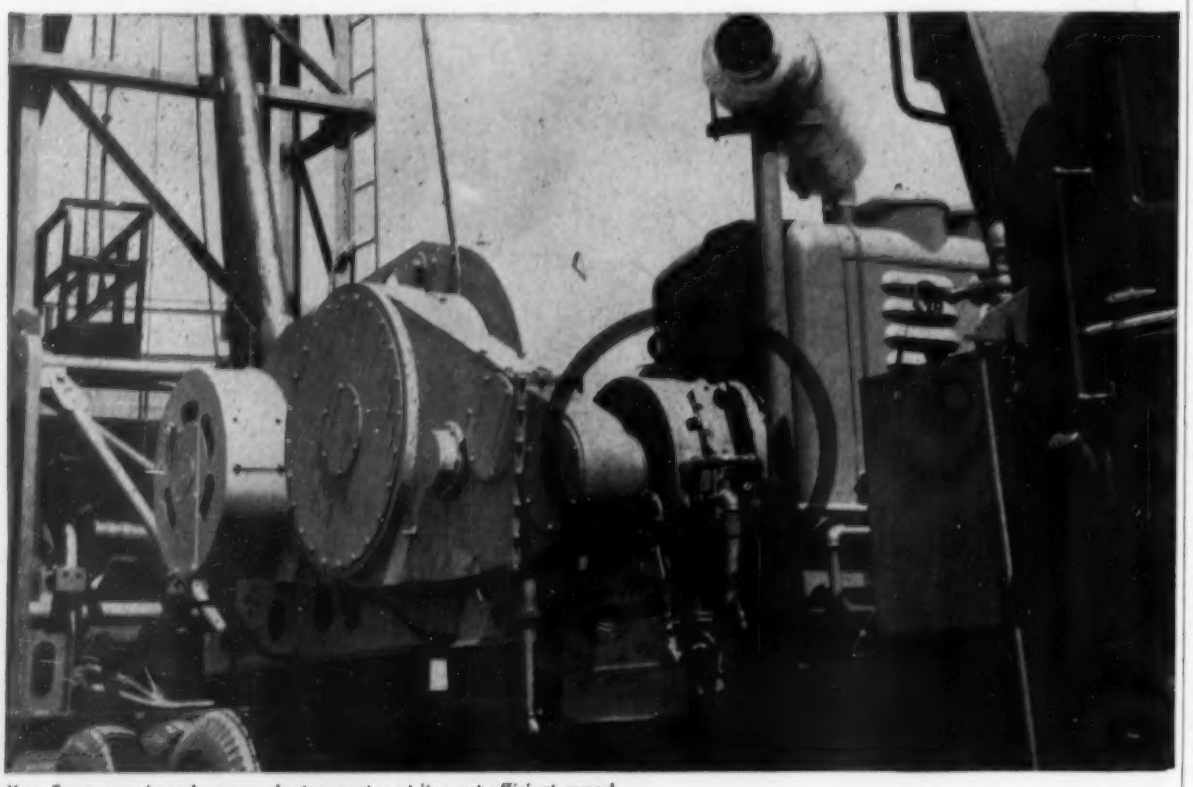
NEW BUDA distributors for material handling devices are Portland, Oregon's Harshberger Equipment Co. and Medford's Haupert Tractor Co.

HAMILTON ENGINE Sales Inc., Portland, announces appointment of American Machine Co., Spokane, as Washington distributor for Buda-Allis-Chalmers material handling units.

LONG BELL LUMBER CO., Gardiner Division, Scottsburg, Ore. has purchased two 6DAT-844 turbocharged Buda diesels to repower LMSW Macks.

CROFTON DIESEL Engine Co., San Pedro, has delivered a GM 23300, powering a 12½ kw generator set, to Mr. Basalucci, San Diego.

PORTLAND'S KEN BROOKS has purchased a 6DAMR-273 Buda marine die-



Your Torcon-equipped power plant operates at its most efficient speed.

Self-contained oil circuit keeps TORCON efficiency high

This simple design feature is a big factor in keeping TORCON efficiency consistently high: the oil sump is an integral part of the housing—no complicated oil seals to lessen efficiency and complicate maintenance. Oil passages are cored in the housing—no extra hoses and fittings.

Easy accessibility is valuable, too. Simply remove two cover-plates, and the whole unit is fully exposed for inspection and service—no special tools needed.

The Clark-Torcon is a complete unit, mass-produced, available off-the-shelf to engine and original equipment manufacturers, and to owners and operators. It's the broadest line available to industry, with a wide range of wheel diameters and a complete choice of options, for easy fitting into any torque-transmission system.

There's a Torcon to FIT YOUR NEED

This fully illustrated, easy-to-read bulletin explains torque multiplication clearly; and indicates its many industrial applications. Use the coupon to get your copy.

A Complete Quality Line—Clark-Torcon

All Sizes—from 15 to 600 H.P.

Broad Range of Options—readily adaptable to many applications

No Cavitation—proper oil flow prevents turbulence and formation of air pockets to cause wear and loss of efficiency

High Efficiency over wide range—more work done, and reduced wear on components

Individually Cast One-Piece Elements—no welds or fabrications to distort under extreme loads

SCHNEIDER SYSTEM

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY, Jackson 2, Michigan: Please send the CLARK-TORCON Bulletin

Name _____ Position _____

Firm _____ Address _____

City _____ Zone _____ State _____

sel to power his 31-ft. cruiser. Another engine of the same model has gone to Maurice Nulf, North Bend, Oregon, to repower his fishing boat.

FOR C. E. GERVAIS, Canyonville, Ore., a 6DA-844 Buda for his White Model 2464 truck, for hauling between Southern Oregon and points in California.

PAPE' BROS—with facilities in Eugene, Roseburg and North Bend, Oregon—has been named materials handling distributor of Buda equipment in its areas.

Batavia Levers

Now assembled from standard, stocked forgings without requiring special dies or tooling, Batavia levers are ready for wider use throughout industry. Batavia levers have been in broad use to start, stop and control earth-moving machinery, trucks, buses, hydraulic equipment, hoists, cranes, pumps, materials handling equipment, oil field rigs and draw works.

In addition to its full line of levers and lever assemblies, Batavia Metal Products also manufactures winch and transmission controls. Designed for cab mounting on automotive equipment, Batavia winch controls are manufactured with 1, 2 or 3 levers and equipped (optionally) with an all-welded steel housing. Batavia transmission controls are furnished in 2 and 3-bar types.

The new, illustrated 16-page Bulletin HW-B3 presents the extensive line of levers and control units. Including a photographic chart to show how special levers are assembled from standard forgings, the bulletin contains detailed drawings, product illustrations and application photos. Copies of Bulletin HW-B3 can be obtained by writing to Batavia Metal Products Corporation, Batavia, N.Y.

Orders Tug

The Turecamo Towing Corporation, Brooklyn, New York, has placed an order with the Cleveland Diesel Engine Division of General Motors for a new 95-ft. harbor tug, it was announced by B. Turecamo, president. The tug will be powered with a 1600 shp Cleveland diesel engine and built at the Jacobsen Shipyard, Oyster Bay, Long Island, N. Y. Mr. Turecamo said it will be placed in general towing service in the New York Harbor in late fall.

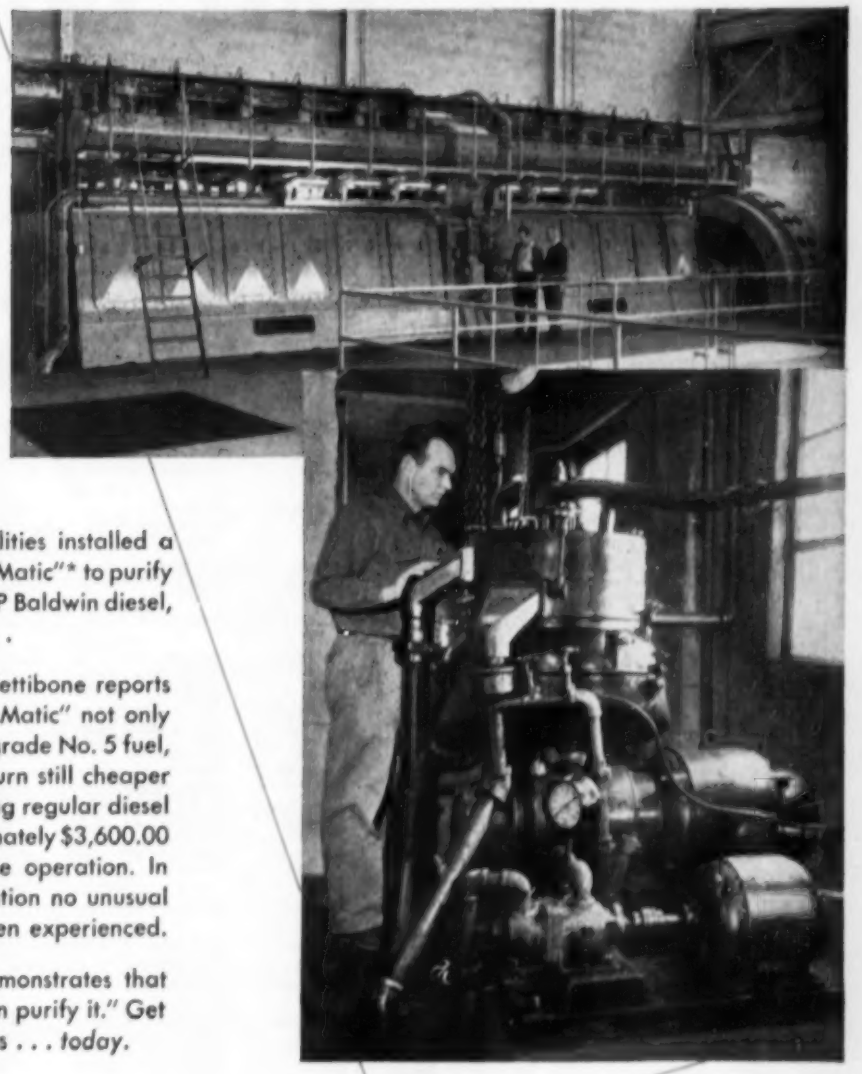
Navy Contracts Awarded

The U.S. Navy recently awarded contracts to three shipyards to build six Landing Ships, Tank to be powered by diesels engines built by Cooper-Bessemer, Fairbanks-Morse, and Nordberg. The construction contracts went to American Shipbuilding Co., Lorain, O., Avondale Marine Ways, New Orleans; and Newport News Shipbuilding & Drydock Co., Newport News, Va. Each company will build two of the vessels.

The Navy Bureau of Ships reports that LSTs 1173, 1174, and 1175 each will have six Fairbanks-Morse 12-cylinder Model 38 ND 8-1/8 diesels rated at 2400 bhp at 850 rpm for main propulsion. LST 1176 will have four Model SS-1116-HSC Nordberg diesels rated 3600 bhp at 900 rpm for propulsion. LST's 1177 and 1178 each will have six Cooper-Bessemer Model FVA 16 DRT diesels rated 2400 bhp at 1000 rpm for main power. All of the amphibious warfare craft will have three 300-kw diesel-electric generator sets.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

DE LAVAL "NOZZLE-MATIC" SAVES $3,600 IN ONE MONTH!



When Decatur Public Utilities installed a De Laval AC-VO "Nozzle-Matic"* to purify heavy fuel for their 5380 HP Baldwin diesel, things really happened . . .

As Superintendent L. C. Pettibone reports it: The De Laval "Nozzle-Matic" not only completely purified poor grade No. 5 fuel, but made it possible to burn still cheaper No. 6! Savings over burning regular diesel fuel amounted to approximately $3,600.00 in one month of part-time operation. In over 3800 hours of operation no unusual ring or liner wear has been experienced.

Once again De Laval demonstrates that "If you can pump it, we can purify it." Get all the money-making facts . . . *today.*

*Trademark

DE LAVAL
heavy oil purifiers

THE DE LAVAL SEPARATOR COMPANY Poughkeepsie, New York • 427 Randolph St., Chicago 6 • DE LAVAL PACIFIC CO. 61 Beale St., San Francisco 5

Mid-Continent Diesel News

By **L. H. Houck**

THE Riney-Ryan Tractor Co. branch at Fulton, Mo., delivered an Allis-Chalmers HD-5 to the Smarr Coal Co., Columbia, Mo. Riney-Ryan, with headquarters in St. Louis, bought the Fulton branch of Cooke Tractor Co., St. Louis, the first of the year. Sales and service will be handled from this point north to the Iowa line on Allis-Chalmers and other lines.

THE Kansas City office of Fairbanks, Morse & Co., has sold a 12-cylinder opposed-piston engine to the city of Stockton, Kansas, for light and power purposes. Erection and testing has been completed. The new unit is direct-connected to a 1360-kw generator and is rated at 920 hp. It is equipped for dual-fuel operation.

KOSTE Machinery Co., Inc., Bernard F. Koste, president, a new dealer specializing in the Oliver line of track-type tractors and diesels, has opened in a new building in St. Louis at Natural Bridge and the airport on US 66. The firm has a branch in Springfield, Mo.

MISSOURI-Illinois Tractor Co., St. Louis, has delivered two M-R-S 190 scrapers with Cummins 250 turbocharged diesels to Guttermuth Construction Co., and Crawley Construction Co., St. Louis.

MARLOW, Okla., is well prepared for the summer air conditioning electric load with the installation of two Fairbanks-Morse 8-cylinder, 1280 hp, opposed-piston diesels, direct connected to Fairbanks-Morse 900 kw generators. Both units are now in operation.

MENEFEE Construction Co., Sedalia, Mo., holder of a 10-mile grading contract on US 66 west of St. Louis, bought three new Euclids with factory-installed sideboards which boost the capacity from 16 to 20 cu. yds. The Eucs are powered with 6-71 GM diesels.

BRENTWOOD Construction Co., St. Louis, has placed two TD-14s in service with 'dozer equipment from Mo.-Ill. Tractor Co.

OPERATION AND testing is completed in Pawhuska, Okla., of a Fairbanks-Morse 8-cylinder, 2800 hp dual-fuel engine, direct connected to an F-M 2000-kw alternator.

AN Ingersoll-Rand Gyro-Flow 600 cfm with a series 6-71 GM diesel, has been delivered to the Luhr Construction Co., Columbia, Ill., by the Mo.-Ill. Tractor Co., St. Louis.

H. H. HALL Construction Co., St. Louis, has taken delivery on a 75 International Payscraper from Mo.-Ill. Tractor Co. This is a 16-yd. unit with International diesel engine. A TD-14 International torque-converter tractor was delivered at the same time equipped with push bars for push-loading the same scraper.

M. C. CHERMUS, owner of Chermus Construction Co., St. Louis and Lynn McMillan, formerly with John Fabick Co., Caterpillar dealers, have gone into the heavy machinery business under the name of Midwestern Equipment Co., and are located at Robertson, Mo.

A FAIRBANKS-MORSE 10-cyl., 2000 hp dual-fuel engine, direct connected to a 1400 kw F-M alternator, has been placed in operation at Hoisington, Kansas.

NOR-BELL Construction Co., St. Louis, has taken delivery on a TD-24 with straight transmission and a TD-18 with straight transmission from the Mo.-Ill. Tractor Co.

AMERICAN

AUTHORIZED FUEL INJECTION SERVICE

Faithful, economical performance of Diesels equipped with American Bosch Fuel Injection Systems is backed by a world-wide fuel injection service organization . . . staffed with factory-trained technicians . . . using the latest and most efficient methods . . . working with highly specialized equipment designed and built to American Bosch exacting standards.

All this adds up to fast accurate repair work that saves time and money for owners of American Bosch-equipped Diesels. Cost-conscious operators appreciate American Bosch standards that assure them dependable performance and convenient facilities for prompt, reliable servicing.

To find the name of the authorized American Bosch fuel injection service station nearest you in the U.S.A. and Canada, check the directory below:

DIESEL FUEL INJECTION SERVICE STATIONS

ALABAMA		
Birmingham, 3	Birmingham Electric Battery Co.	Ave. B & 23rd St. S.
ARIZONA		
Casa Grande	Diesel-Electric Service Co.	202 E. Main St.
Mesa	Perkins Diesel Service	747 South Country Road
Phoenix	Charlie C. Jones Battery & Electric Co.	318-322 W. Jefferson St.
Tucson	Auto Plane Electrical Service	1037 South 6th Ave.
Yuma	Yuma Automotive Electric	229 8th St.
ARKANSAS		
N. Little Rock	Womack Bros. & Taylor	1219 E. Broadway
CALIFORNIA		
Bakersfield	Automotive Diesel & Electric Co., Inc.	1017 30th St.
Calexico	Calexico Pump & Magneto Co.	115 East Third St.
Eureka	Gustafson Diesel & Electric	5th & Commercial Sts.
Fresno	Winther Bros.	612 Divisadero St.
Los Angeles	Diesel Precision Company, Inc.,	4847 Anaheim Telegraph Rd.
Los Angeles, 21	Magneto Sales & Service Co., Inc.	751 Towne Ave.
Oakland	Diesel Injection & Governor Serv., Inc.	985 Seventh St.
Oakland	Pimental & Son	401 Eighth Ave.
Sacramento	Diesel Pump & Injector Service	414 16th St.
Sacramento, 6	Langner & Rifkin	1116-22 15th St.
Salinas	Haag Diesel & Electric	137 Abbott St.
San Bernardino	Diesel Injection Service	932 Mill Street
San Diego	Electric Diesel & Equipment Co.	1268 Kettner Boulevard
San Francisco, 24	McKinley Corporation of California	2196 Palou Ave.
South Gate	Diesel Fuel Injection Lab.	5775 Meadow Road
Wilmington	Diesel Control Corp.	218 N. Marine Ave.
COLORADO		
Denver, 3	Central Auto Electric Company	1171 Lincoln St.
CONNECTICUT		
Hartford	W. J. Connell Co. of Hartford	85 Airport Road
DISTRICT OF COLUMBIA		
Washington	Diesel & Ignition Service Inc.	925 Girard St., N. E.
FLORIDA		
Jacksonville	Patten Sales Co., Inc.	1021 Hogan St.
Miami	Dade Diesel Company	3280 N. W. South River Drive
Miami, 36	Florida Diesel Service Co.	1930 N. Miami Ave.
Orlando	Interstate Diesel Service	206 N. Orange Blossom Trail
Tampa	Stuart Diesel Service	2109 4th Ave.
GEORGIA		
Atlanta, 3	Auto Electric & Magneto Co.	477 Spring St., N. W.
Cairo	Grady Motors	201-5th St., N. E.
IDAHO		
Blackfoot	Auto Parts Service Co.	96 S. Broadway
Boise	Magneto & Diesel Supply Co.	2406 Main St.
Lewiston	Osterman Diesel & Electric Co.	1610 E. Main St.
Twin Falls	Diesel Pump & Injector Service	West Madison Avenue at Roman Lodge
ILLINOIS		
Chicago, 16	Illinois Auto Electric Co.	2011-37 So. Indiana Ave.
Peoria	Automotive Ignition Co.	522 Franklin St.
Rock Island	Lohse Automotive Service	430 17th St.
INDIANA		
Indianapolis, 4	Gulling Auto Electric Inc.	450 N. Capitol Ave.
Mentone	Smith Brothers Garage	
IOWA		
Cedar Rapids	Hogan's Carburator & Electric Co.	209 Seventh St., S. E.
Des Moines	Electrical Service & Sales Co.	1313 Walnut St.
KANSAS		
Great Bend	Bell Engine Service	3810 West Tenth
Grinnell	Grinnell Electric & Diesel Service Co.	
Salina	The Motor Service Company	8th & Pacific
Wichita, 2	E. S. Cowie Electric Co.	230 S. Topeka Ave.
KENTUCKY		
Louisville	Diesel Injection Service	Shelby at Mulberry St.
Louisville	Schaaf Auto Electric Co.	Broadway at Jackson
Paducah	Story Electric & Battery Co.	621 Jefferson Street
LOUISIANA		
Baton Rouge	Womack Bros. Diesel Service	3983 Airline Hgw.
Bossier City	Vaughan Tractor & Auto Parts Co.	601 West First Street
Morgan City	Landry's Diesel Injector Service	1009 Front Street
New Orleans	Gerhardt's Inc.	1917 Jefferson Hgw.
New Orleans, 13	John M. Walton, Inc.	1050 Carondelet St.
MAINE		
Portland	Eastern Diesel Service Co.	997 Congress St.
Portland, 5	Portland Tractor Co., Inc.	803 Forest Ave.
MARYLAND		
Baltimore, 1	Parks and Hull Automotive Corp.	1033 Cathedral St.
Baltimore	Stephen Seth & Co.	876 Park Ave.
MASSACHUSETTS		
Boston	Boston Fuel Injection & Engine Service	280 Northern Ave.
Boston, 64	W. J. Connell Company	210 Needham St.
Boston, 10	Wharf Machine & Electric Co., Inc.	Fish Pier Road
Fairhaven	Hathaway Machinery Co., Inc.	Hathaway-Braley Wharf
Springfield	C. A. Krohne & Sons	833 Columbus Ave.
MICHIGAN		
Detroit	Knorr-Maynard, Inc.	5743 N. Woodward Ave.
Lansing	Diesel Equipment Sales & Service	2520 S. Pennsylvania Ave.
MINNESOTA		
Hibbing	Diesel Service Company	1800 Third Ave., East
Minneapolis	Diesel Service Co.	2509 E. Lake St.
Minneapolis, 2	Reinhard Bros. Co., Inc.	11 South 9th St.
MISSISSIPPI		
Jackson	Womack Brothers	1305 South Gallatin St.
MISSOURI		
Kansas City, 8	Electrical & Magneto Service Co.	2538 Grand Ave.
St. Louis, 23	Diesel Fuel Injection Service Co.	9331 So. Broadway
St. Louis, 3	Electric Parts and Service Co.	2900 Washington Blvd.
MONTANA		
Billings	Original Equipment, Inc.	423 North Broadway
Havre	Midwest Diesel Injection Sales & Service	901 Third Avenue
NEBRASKA		
McCook	Automotive Sales & Service	44 West "B" St.
Omaha, 2	Carl A. Anderson, Inc.	16th & Jones
NEW JERSEY		
Newark, 2	Tire Trading Company, Inc.	239 Halsey St.
Trenton, 9	Steinert Diesel Injection Service	Bell Ave. off Klockner Rd.

JOHN Fabick Tractor Co., St. Louis, has delivered a 2½-yd. Lorain shovel with Caterpillar engine, three DW21 Caterpillar 20-yd. scrapers and three D-8 Caterpillar tractors with torque converters and two new model D-8's with straight drive, to W. J. Menefee Construction Co., Sedalia, Mo.

DENVER Tramway Corp., Denver, Colo., after 55 years of trolleys and electric buses, went 100% to diesel buses in June.

THE CITY of Attica, Kansas, has placed an order with Fairbanks-Morse for a 5-cylinder Model 38D8⅛ opposed-piston dual-fuel engine rated at 800 hp and direct connected to a 560 FW Fairbanks-Morse alternator.

HENNESSEY-Forrestal Machinery Co., St. Louis, is new exclusive distributor for Bay City shovels for eastern Missouri and southern Illinois.

Director of Advertising

Appointment of Richard H. Gale, formerly sales promotion manager of Eaton Manufacturing Company, to a newly-created position—director of advertising, was announced recently by R. E. Fisher, Eaton vice president. In this assignment, Mr. Gale will supervise Eaton's advertising, sales promotion and publicity activities.

Mr. Gale was first employed by Eaton in 1929. After approximately eleven years in the Axle Division's service department, he was transferred to axle sales where he handled advertising and sales promotion for the division. In 1952, he was appointed sales promotion manager for the Eaton corporation and served in that capacity until the present time.

A graduate of Case Institute of Technology, Gale is a member of Zeta Psi fraternity. Married, he lives at 1844 East 225th Street in Euclid, and has one son who is now a student at Cornell University.

Forms Association

Industrialization and agricultural development of Pakistan has introduced numerous problems pertaining to the importation, distribution, and maintenance of heavy-duty equipment. Recognition of these problems has led a number of firms to band together into the Tractor Agricultural and Industrial Equipment Manufacturers & Importers Association. Members include: Ali Automobiles, Ltd., Blackwood Hodge (Pakistan) Ltd., Buckwell & Co., Ltd., Dean & Webber (Karachi), East Asiatic Co., Ltd., Greaves Cotton & Co. (Pakistan), Ltd., James Finlay & Co., Ltd., Shahnawaz, Ltd., Volkart Bros., and William Jacks & Co., Ltd., all located in Karachi, plus Tractors (Pakistan), Ltd., Dacca. American manufacturers seeking information or advice are invited to write the Association's office, P.O. Box 4340, No. 5 Wharf Road, Karachi.

Name Change

A new corporation has been formed under the name of Muskegon Camshaft Company. This new name and corporation replaces the Muskegon Motor Specialties Company. Muskegon Camshaft Company is manufacturer of "accuratime" camshafts, and they are located in Muskegon, Michigan.

BOSCH

Keeps Diesels on the job
...everywhere
...anywhere

AMERICAN BOSCH
Springfield 7, Massachusetts
Division of American Bosch Arma Corporation

2229

NEW YORK		
Brooklyn	A & D Diesel Service, Inc.	145 — 21st St.
Buffalo, 8	Hattrich Electric Service	1032 Ellicott St.
Hempstead, L. I.	A & D Diesel Service, Inc.	887 Nassau Rd.
Pelham Manor	Coretti-Gross, Inc.	44 Secor Lane
Rochester	Union Carburetor & Injection Service	6 Pitkin St.
Troy	Ehrlich Electric Service, Inc.	200 Fourth St.
Utica	Stiefvater Electric Co., Inc.	320-322 Lafayette St.
Woodside, 77	American Bosch Div. American Bosch Arma Corp.	34-21 56th St.
NORTH CAROLINA		
Charlotte	Carolina Rim & Wheel Co.	301 East 8th St.
Raleigh	Diesel Injection Sales & Service	3015 Hillsboro Road
NORTH DAKOTA		
Fargo	Northwestern Diesel Service Co.	2800 Front St.
Williston	Crighton Motor Co.	223 E. Broadway
OHIO		
Akron	Standard Motor Parts	200 Carroll St.
Cincinnati	Tri-State Distributing Corp.	Broadway at Eighth
Cleveland, 14	The Cleveland Ignition Co.	1301 Superior Ave.
Columbus, 15	Columbus Ignition Co.	211 Neilston St.
Lisbon	Lisbon Diesel & Supply Co., Inc.	234 East Washington St.
OKLAHOMA		
Oklahoma City, 2	American Electric-Ignition Co.	124 N. W. 8th St.
Tulsa	Magneto Ignition Company	701 West 5th St.
OREGON		
Klamath Falls	Specialized Service Co.	1434 Main St.
Pendleton	Eds Magneto & Diesel Co.	S. W. 18th & Court St.
Portland, 14	Automotive Products, Inc.	1700 Southeast Grand Ave.
Roseburg	Diesel Injection Service	2145 N. Stevens
PENNSYLVANIA		
Harrisburg	Penn Diesel Service Co.	100 Prince St.
Hazleton	Penn Diesel Service Co.	27th & N. Church Sts.
Mt. Carmel	Gengler's Diesel Service & Sales	2nd & Orange Sts.
Philadelphia	North American Diesel Injection Co.	2523 No. Howard St.
Philadelphia	Sullivan Brothers	1718 Fairmount Ave.
Phillipsburg	Keystone Diesel Inj. Service	Phillipsburg-Clearfield Hgw.
Pittsburgh, 6	Automotive Ignition Co., Inc.	6358-6364 Penn. Ave.
SOUTH CAROLINA		
Charleston	Diesel Fuel Injection Service	208 Savannah Hgwy., P. O. Box 512
Columbia	Boney Diesel Works Co., Inc.	Leesburg Road
SOUTH DAKOTA		
Lemmon	Josund Auto Electric	15 First Ave.
Rapid City	Hoseth Auto Electric	324 St. Joseph St.
Sioux Falls	Reinhard Brothers Company	225 E. 11th St.
TENNESSEE		
Knoxville, 15	Diesel-Magneto Service Co.	1423 Island Home Ave.
Memphis, 4	Automotive Elec. Service Co.	982 Linden Ave.
Nashville	Precision Parts Corp.	400 N. First St.
TEXAS		
Dallas, 1	Beard & Stone Electric Co., Inc.	3909 Live Oak St.
El Paso	Reynolds Batt. & Mag. Co.	901 Myrtle Ave.
Houston, 1	Beard & Stone Electric Co., Inc., 805 Polk Ave., P. O. Box 1717	
Houston	Diesel Pump & Injector Service	6613½ Navigation Blvd.
Houston	Magneto & Diesel Injector Service	6931 Navigation Blvd.
Odessa	Electric Service & Supply	P. O. Box 1417
Pampa	Radcliff Bros. Elec. Co.	519 S. Cuyler St.
San Antonio	S. X. Callahan	425 N. Flores St.
San Antonio	Womack Bros.	123 Carolina St.
UTAH		
Salt Lake City	Diesel Electric Service & Supply Co.	60 East 13th Street
Salt Lake City	Midwest Service & Supply Co.	1333 S. Main St.
VIRGINIA		
Norfolk	Diesel Injection Sales and Service	808 Union St.
Richmond	C. N. Woodward Electric Co., Inc.	709 W. Broad St.
Salem	Diesel Injection Sales & Service	814 E. 8th St.
WASHINGTON		
Seattle	Seattle Injector & Electric Co.	2706 Second Ave.
Spokane	Spokane Diesel & Electric Co.	704 E. Pacific Ave.
Spokane	Sunset Electric Co.	North 703 Division St.
Walla Walla	Walla Walla Motor Supply, Inc.	126 E. Alder St.
Yakima	Diesel & Electric Service Co.	1506 So. First St.
WEST VIRGINIA		
Charleston	Mountain Service	6414 McCorkle Ave.
WISCONSIN		
Milwaukee, 2	Wisconsin Magneto Company	918 N. Broadway
WYOMING		
Casper	Cotter Battery & Electric Company	402 E. 2nd St.
ALASKA		
Anchorage	Automotive Diesel Electric Supply & Overhaul	2424 E. 5th Ave.
Juneau	Van's Diesel Service	102 2nd St.
CANADA		
Calgary	Hutton's, Ltd.	131 — 11th Ave., W.
Edmonton	Smith Battery & Auto Electric	10125 — 105th St.
Fredericton	Stairs Bros. Fuel Injection Service Station	493 Northumberland St.
London	Universal Ignition & Battery Ltd.	324 York St.
Montreal	International Electric Co., Ltd.	1037 Bleury St.
Montreal	Northam Equipment, Ltd.	4135 Rowen St.
Quebec	Quebec Gas & Diesel Engines, Ltd.	145-147 rue Prince Edouard
Regina	Electric Motor Service	1734 Broad St.
St. John's (Newfoundland)	A. H. Murray & Co., Ltd.	
Saskatoon	Lambert Electric, Ltd.	114-116 Ave. A, North
Toronto	A. Cross & Co., Ltd.	6 Spadina Ave.
Toronto	Auto Electric Service Co., Ltd.	1009 Bay St.
Vancouver	Fred Holmes Fuel Inj. Sales & Service Ltd.	627 Bidwell St.
Vancouver	Jeffree & Jeffree, Ltd.	775 Homer St.
Vancouver	MacFarlane & Co., Ltd.	1955 Columbia St.
Vancouver	Vivian Diesels & Munitions, Ltd.	1660 Station St.
Winnipeg	Brown & Murray, Ltd.	237-241 Fort St.
HAWAII		
Honolulu	Honolulu Iron Works Company	28 No. Queen St.
Honolulu	Todoki Machine & Marine Works	810 Halekauwila St.
PUERTO RICO		
San Juan	General Farm Equipment Co.	742 Las Palmas Ave., Stop 12, Miramar

(List of foreign service stations available on request)

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

Chicago Power Show Expanding

Exhibit space in the Chicago Exposition of Power and Mechanical Engineering is being engaged at a rapid rate, and it appears that facilities available in a new area of the Chicago Coliseum may be required to meet the demand. The display will be held November 14 to 18 under the auspices of the American Society of Mechanical Engineers, as a part of the Diamond Jubilee Annual Meeting, which concludes the year-long celebration of the Society's 75th year.

The exposition will cover every phase of power generation and industrial use. Exhibits for which space already has been allotted embrace such widely assorted equipment as diesel engines, electric motors, oil purifiers, speed reducers, vibration control systems, electrical testing instruments and instruments for the automatic control of apparatus ranging all the way from machine tools to entire plants for producing power or regulating its use in manufacturing.

As previously announced, an atomic power section will be a feature of the exposition, disclosing phases of the application of atomic energy to power of special interest to mechanical engineers.

The Chicago Power Show is under the management of the International Exposition Company, 480 Lexington Ave., New York 17, N.Y. E. K. Stevens is the exposition manager.

Simplifies Filter Disc Replacement

Replacement of discs is made easier with the newly designed bolted-head Model I 6-15 D disc filter manufactured by the U. S. Hoffman Machinery Corporation for industrial oil filtration. The filter is designed to provide 5 to 50 gallons per minute at operating pressures up to and including 50 pounds. The head and body of the filter are attached by eight conveniently located nuts and bolts. The Hoffman disc filter consists of a cast aluminum body attached to a cast aluminum head. There are two bored holes in the head which are threaded to receive pipe for clean and dirty coolant lines.

Filtration is accomplished by a series of metal screen discs completely covered by felt or cloth. A spring held perforated metal tube, extending from the bottom of the filter to the clean coolant outlet, supports the filter discs and acts as a manifold. If required, a relief valve may be installed in conjunction with the external piping. Flow rates are dependent upon the dirt content and the viscosity of the liquid to be filtered. The filter will remove dirt particles measuring from 3 to 5 micro inches.

GM Regional Headquarters

Establishment of a General Motors regional public relations headquarters in Los Angeles, Calif., and appointment of Harry L. Blair as regional public relations manager there was announced by Paul Garrett, GM vice president in charge of public relations. The Los Angeles office, at 3440 Wilshire Boulevard, previously has been part of a region with headquarters at San Francisco. It now will be headquarters for GM public relations activities in Southern California, southern Nevada and the states of Arizona and Utah. John W. Reedy, who as assistant regional manager has been in charge of the Los Angeles office since 1954, has been promoted to regional public relations manager in Detroit.

Denver Company Appointed Representatives

Darling-Kenady Company, industrial sales engineers, of 305 Mining Exchange Building, Denver, Colo., have been appointed representatives of Burgess-Manning Company, industrial sound control equipment manufacturers.

Superior Model 65 Engines, available with ratings up to 1765 B. H. P.

LONGER SERVICE LIFE...
MINIMUM MAINTENANCE AND REPAIRS...
LOWEST FUEL AND LUBRICATION COSTS!

SUPERIOR
and ATLAS DIESELS

Hundreds of case history records on file are firm proof of these benefits. Ask to see them at any of our sales and service points. Outstanding performance of Superior and Atlas Diesels has been achieved by constant research and development. You can continue to buy with confidence because the vast facilities of the White Motor Company are now dedicated to carry on intensified research and development and precision manufacturing of the Superior and Atlas Diesels.

Superior 4 cycle Stationary or Marine Diesels are available in a range from 185 to 1765 B.H.P. Atlas 4 cycle Stationary or Marine Diesels are available in a range from 95 to 1000 B.H.P.

Write to nearest branch office listed below for complete information.

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
Plant and General Offices, SPRINGFIELD, OHIO

Superior ENGINES · ATLAS · White

SALES AND SERVICE POINTS: Gloucester, Massachusetts • Houston, Texas • Fort Worth, Texas • San Diego, California • Terminal Island, California • Ketchikan, Alaska • Washington, D.C. • Portland, Oregon Astoria, Oregon • Casper, Wyoming • St. Louis, Missouri • Halifax, Nova Scotia • Vancouver, B.C. Park Rapids, Minnesota • New York, New York • Seattle, Washington • New Orleans, Louisiana

Executive Changes

David W. Mansell, executive vice president and director of Brush ABOE, Inc., has been promoted to sales manager of the National Gas & Oil Engine Company, Ltd., Ashton-under-Lyne, England. Nationals, who are members of the Brush Group, are one of the largest manufacturers of heavy diesel, dual fuel and natural gas engines in England today. Mr. Mansell will leave New York to take over his new responsibilities in August.

A. A. (Sandy) King has been appointed to succeed Mr. Mansell as executive vice president and director of this company from July 15th. Mr. King, a mechanical engineer by profession, started his career with Petters Limited in 1931 and, except for a five year period in the armed forces during World War II, has been with the Brush Group ever since. During the past seven years Mr. King has been engine sales manager for the Brush Group in the Far East based on Singapore.

Re-Equipping With Diesel

Yellow Transit Freight Lines, Inc., Kansas City, Mo., one of the Midwest's largest highway carriers, in re-equipping its fleet for diesel operation has just purchased 200 Cab-Beside-Engine trucks from Kenworth Motor Truck Corp., Seattle. Six-cylinder turbocharged model JT-600 Cummins engines power the new vehicles.

This large fleet order, announced by Robert D. O'Brien, Kenworth vice president-sales, came as a result of a Kenworth engineering analysis of the operating requirements of Yellow Transit. Operating more than 900 units of truck and trailer equipment over a network of 8435 miles of certificated routes extending from the Great Lakes to the Gulf of Mexico, Yellow Transit Freight is a common carrier of general freight.

Starting with its revolutionary new lightweight, functional, high-visibility Cab-Beside-Engine design, Kenworth engineered a specialized truck with a high horsepower to low weight ratio suitable to the Midwest terrain and length restrictions, which still maintains the performance, stability, and long life normally associated with West Coast type vehicles, O'Brien explained. Custom-engineered to an estimated tractor chassis weight of 8998 pounds per unit, the 138-in. CBE tractor combines with a 35-ft. van semi-trailer for an overall length of 45 ft. and a gross combination weight rating of 60,000 pounds.

Named To Engineering Post

John M. Wilson has been named chief engineer of the development and design division of the engineering department of Minneapolis-Honeywell's Brown Instruments Division, it was recently reported. Mr. Wilson, formerly chief electrical engineer for the parent firm in Minneapolis, is a graduate of the University of Minnesota. He joined Honeywell in 1933.

Delivers Locomotive

The Texas Company, New York, N. Y., has accepted delivery of a 25-ton diesel-hydraulic locomotive from Baldwin-Lima-Hamilton Corp., Philadelphia, Pa., for use in its Bayonne terminal. Equipped with a Cummins diesel engine rated 225 brake horsepower at 1,800 rpm, the locomotive exerts a tractive effort of 12,500 pounds at 25 per cent adhesion.

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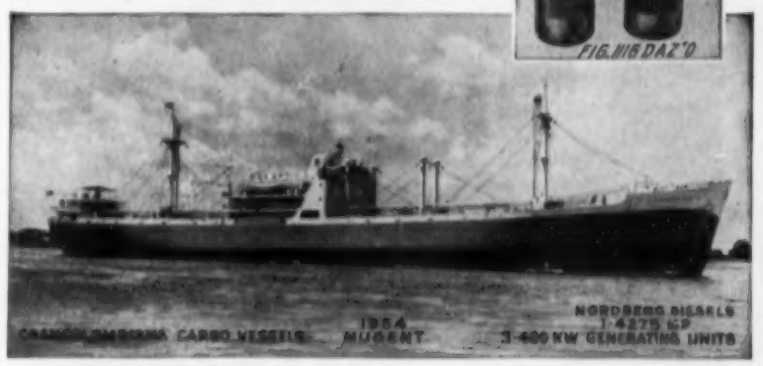
NUGENT
FUEL OIL FILTERS



Shown above is a Nugent Duplex Fuel Oil Filter of the type installed as original equipment on the propulsion diesels serving the Flota Mercante vessels. Recharges are inexpensive bag type — easy to replace.

Original Equipment for Merchant Fleet

SHOWN above is the Ciudad de Cali, one of the newest in a fleet of Cargo ships built for Flota Mercante Grancolombiana, S.A. Each of these vessels is powered by a 4275 shp Nordberg Marine Diesel equipped with a Nugent Fig. 1116 CAA#4 Duplex Fuel Oil Filter. Auxiliary power on each of the vessels is supplied by a Nordberg Supercharged Diesel Cenerating Unit equipped with a Nugent Fig. 1116 DAZ#0 Duplex Fuel Oil Filter. The Grancolombiana installations are still another example of Nugent filters being included as original equipment by a leading diesel manufacturer.

By actual test, Nugent filters of the above types remove 99.8% of all foreign solids from the fuel oil supply. With either model, the duplex units can be operated in parallel; or one at a time to allow cleaning without interrupting operations. Slow manipulation of the valves will not cause stoppage or high pressure. These are only a few of the reasons why Nugent Filters are selected as original equipment by leading diesel engine manufacturers.

Write for complete information on how Nugent can solve your own fuel or lube oil filtering problems. There is a Nugent Filter of the right size and type for every job.

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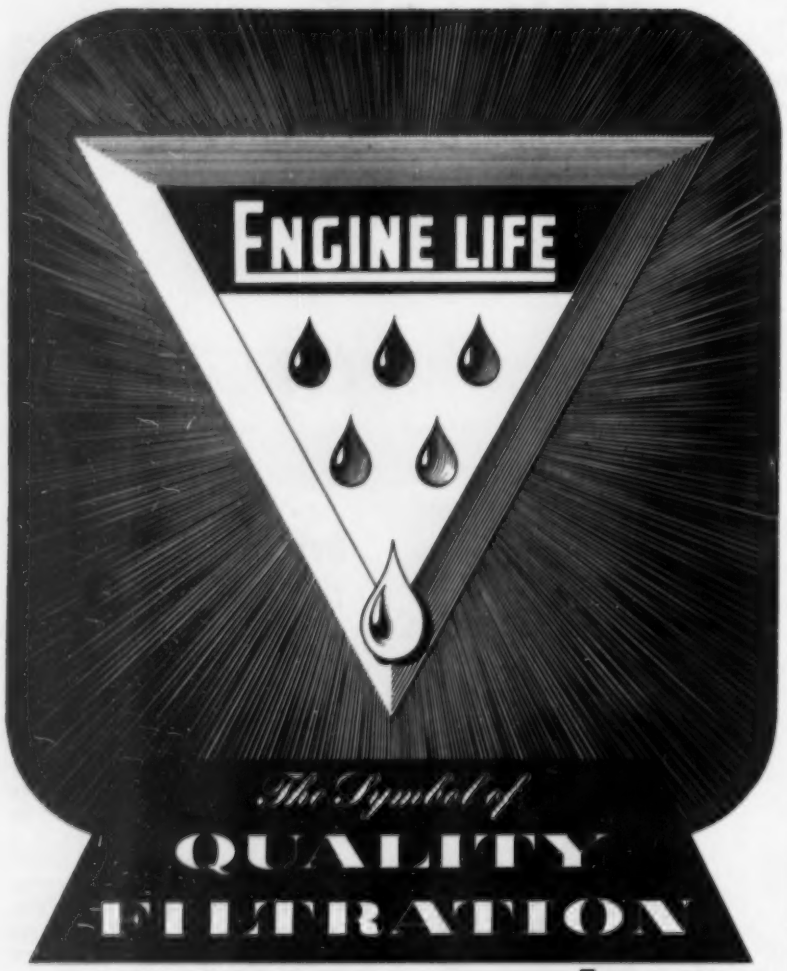

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DIESEL ENGINE CATALOG

The purpose of this little advertisement is to tell you about Volume 20 of DIESEL ENGINE CATALOG which is now available, entirely revised and rewritten. This is the 20th edition of the book that has earned the name of "the bible of the industry."

All smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar, the DIESEL ENGINE CATALOG gives them full, accurate information when they need it most.

The consulting engineer keeps this book in his reference file. It immediately gives him *all* data on diesel engines coming within a given horsepower range, speed range and weight range.

People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Orders are now being accepted for this latest edition. Price $10.00 prepaid.

Add California Sales Tax for Delivery in That State

DIESEL PROGRESS
COLE STATION
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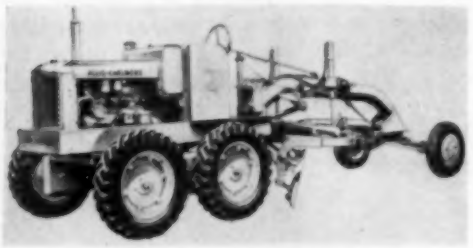
Announces New Diesel Motor Grader



Allis-Chalmers has introduced the Model D motor grader powered by a new Allis-Chalmers 6-cylinder, valve-in-head diesel engine, rated at 50 max. bhp at 1625 rpm. The engine has a 3-7/16-in. bore, 4-1/8-in. stroke, and 230 cu. in. piston displacement.

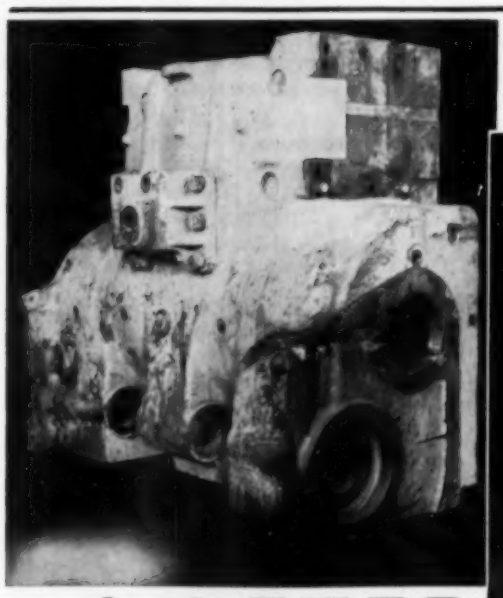
Direct electric starting on diesel fuel is provided by a 12-volt starting system. Incorporated in this new engine are features such as replaceable wet-type cylinder liners; by-pass cooling system with high capacity water pump; pressure lubrication; aluminum alloy pistons; simple, easily serviced fuel injection system; and 4 filters to assure clean fuel.

Weight of the Model D (diesel) is 9350 lbs. with 2760 lbs. on the front wheels, and 6590 lbs. on the rear wheels. Blade pressure is 4900 lbs. Speeds with 7.50x20 tires range from 2.6 mhp in first gear to 25.2 mph in fourth gear. Basic design features include roll-away moldboard, single member tubular frame, tandem drive, compact and rugged gearing, heavy drawbar and one-piece circle. Special equipment includes 135-degree power circle turn, leaning wheel with 25 degree range each way, power-shift moldboard, mid-ship mounted scarifier, 12-ft. moldboard, 10-ft. moldboard with end bits, 2-ft. extensions, cab, snow plow, windrow eliminator, shoulder maintainer and rear-end loader.

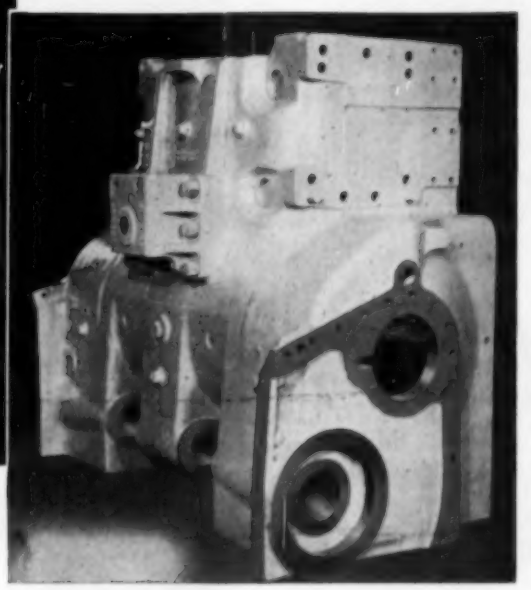
Handy Spot- And Trouble-Light

California Company, manufacturers of Tel-A-Lite, has announced large scale production of their truck, marine and auto spot- and trouble-light. The light consists of a sealed-beam lamp and reflector housed in well-built unit designed in the form of a telephone handset. It can hang anywhere inside the vehicle on a convenient bracket, resembling a mobile telephone. The telephone-type retractable cord stretches to ten feet and the unit will throw a beam 300 feet. Hooking one lead into a hot line and grounding the other is all that is required to install it.

The Tel-A-Lite draws only ½ amp from the battery. Sturdy construction, designed for hard use assures trouble-free operation. The manufacturer points out that having the spotlight inside the vehicle prevents theft and weather damage. For marine use, a special aircraft type hanger and clamp is provided. For further information regarding Tel-A-Lite, write California Company, 942 S. La Brea Ave., Los Angeles 36, Calif. (ITS NEW)



BEFORE



and AFTER

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DIESEL ENGINE CATALOG

Volume Twenty

You, too, need it on your desk (or in your car—if you're in any way concerned with diesel, dual-fuel or gas engine buying, selling, repairing or servicing.

Be sure to order your copy of Volume 20 now! Only $10.00 post-paid. (Please add sales tax for delivery in California.)

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DIESEL PROGRESS

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Volume 20 has received the largest number of advance orders in the 20-year history of DIESEL ENGINE CATALOG! Be certain of your copy. Order now.

Offers New Crane

A self-propelled diesel-electric revolving crane with several new features is being manufactured and marketed by R. G. LeTourneau, Inc., Longview, Texas. One innovation is the use of outriggers which are controlled electrically from the cab. Another development is the use of individually powered electric wheels.

The crane's power plant consists of a Model 6DAS-844 Buda diesel and a LeTourneau-built generator. The unit weighs approximately 40,000 lbs., has a 12-ft. wheel base; a turning radius of about 24 ft; and a maximum travel speed of about 7 mph.

The photograph shows the electrically-controlled, retractable outriggers set before the front tires. The manufacturer states that these greatly facilitate spot-to-spot loading.

A new, illustrated folder is available with fuller details. It states the crane has a capacity of 150 ft./tons, and shows the effective working ranges for both 30- and 40-ft. booms. For detailed information write R. G. LeTourneau, Inc., 3000 S. MacArthur, Longview, Texas. (ITS NEW)

Ohio Crankshaft Promotions

C. H. Kimmel

M. J. Hoke

At the annual board of directors meeting C. H. Kimmel was elected president of The Ohio Crankshaft Company, Cleveland, Ohio. Mr. Kimmel joined Ohio Crankshaft in 1940 as factory manager of the crankshaft and camshaft division. In 1946 he was made general manager of this division of the company. In May 1952 he became a vice president, and in March 1953 vice president and general manager of the entire company. At the same meeting, M. J. Hoke was named vice president and general manager of the crankshaft and camshaft division. Mr. Hoke joined Ohio Crankshaft in 1945 as a development engineer. In 1947 he was made chief engineer and the next year works manager.

Mr. W. C. Dunn, co-founder and president of Ohio Crankshaft since its inception in 1920, while retiring from routine business activities, continues his long association with the company in the capacity of board chairman. The company is the largest independent producer of crankshafts and camshafts for gasoline and diesel engines, and has attained a leading position in the field of high frequency induction heating with its Tocco process.

Vice President and General Sales Manager

Charles J. Wallace

Charles J. Wallace has been elected vice-president and general sales manager of Houdaille-Hershey of Indiana, Inc., according to an announcement from the company's home office in Lebanon, Indiana. Mr. Wallace has had extensive experience in virtually every phase of the filtration industry. He comes to Lebanon from the parent Houdaille-Hershey Corporation in Detroit.

Houdaille-Hershey of Indiana manufactures oil and coolant filters for diesel, hydraulic, turbine, power generating and other industrial equipment.

Technical Brochure

The answers to many piston and sealing ring problems are now available in a new 8-page brochure. Precision un-breakable wrought alloy piston and sealing rings are designed and produced to meet the demands for maximum quality and performances according to the manufacturer. The un-breakable characteristics of these rings, due to heat treating processes, provide unlimited applications. Precision piston and sealing rings are used in atomic reactors, turbo-prop engines, numerous aircraft applications, hydraulic and pneumatic pressure devices, die casting machines and where compression containing problems are involved.

Technical data and complete descriptions of the physical properties of the eight alloys used in Precision un-breakable piston and sealing rings as well as the coefficients of friction are discussed. Precision rings made of Haynes Stellite, the most heat resistant of the 8 alloys, will withstand temperatures to 2000° F. and are resistant to acids, radio-active corrosion and oxidization. They are manufactured to specific standards and methods whereby uniform tension throughout the entire circumference is achieved, yet, have the flexibility and resiliency to conform to the cylinder wall and to withstand excessive temperatures without collapsing.

Write for your copy of this brochure to Precision Piston Rings, Inc. Dept. B-256, 1417 Commerce Ave., Indianapolis 1, Ind.

Assume New Posts

E. W. Kettering

B. B. Brownell

Appointment of E. W. Kettering, formerly chief engineer, to the newly created post of director of research, and promotion of B. B. Brownell, assistant chief engineer to chief engineer of Electro-Motive Division of General Motors is announced by N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive.

"The research department will concern itself with forward product planning," Mr. Dezendorf said, "while the engineering department will carry on all engineering of products of Electro-Motive manufacture."

Mr. Kettering, who joined the staff of the Winton Engine Company (later Cleveland Diesel Engine Division of General Motors) in the fall of 1930, has been associated with projects contributing to the development of General Motors diesel locomotives since the beginning of his career.

Mr. Brownell, a native of Amherst, Nova Scotia, is a graduate of Massachusetts Institute of Technology, where he received a degree in electrical engineering. He joined Delco Products Division of General Motors in 1935, transferring two years later to Electro-Motive Division as a junior electrical engineer.

Dynamometer Test Procedure Developed

A complete dynamometer diagnosis and adjustment procedure for Cummins dieselized trucks has been published jointly by the Service Training Divisions of the Clayton Manufacturing Company, El Monte, California, and the Cummins Engine Company, Columbus, Indiana. The purpose of this comprehensive procedure, which is free to truck shop service managers, it to help an organization keep abreast of the latest developments and techniques in diesel engine service and repair. For service shops equipped with dynamometers, the book offers many valuable helps in obtaining maximum horsepower and minimum fuel consumption.

Three main subjects covered are checking road horsepower, checking ailments or performance complaints and making routine inspections. For a copy, request Form C-566, Clayton Manufacturing Company, Box 550, El Monte, California.

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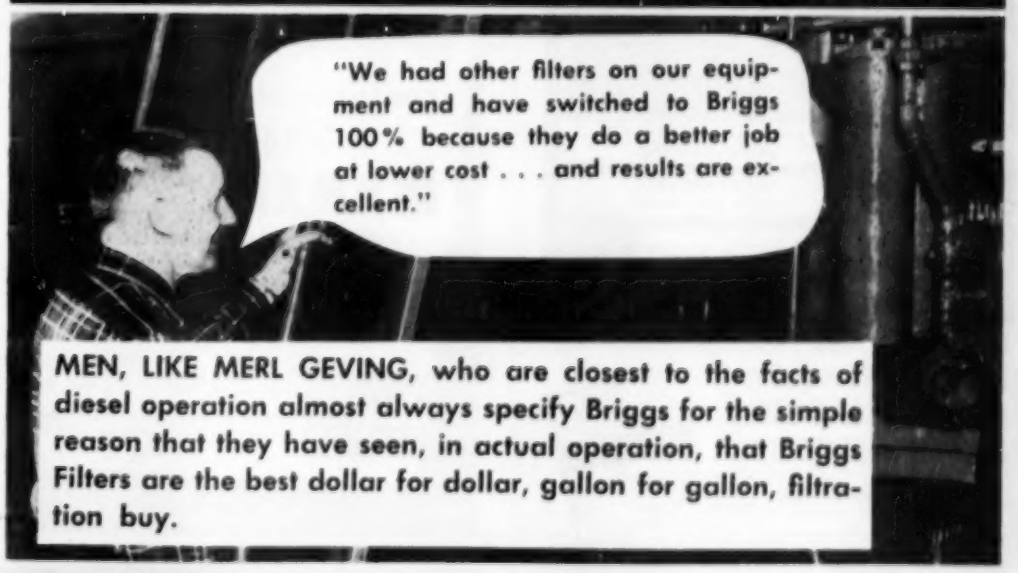
"WE SWITCHED 100% TO BRIGGS"

Says Merl Geving, Plant Superintendent

LE SUEUR LIGHT & POWER COMPANY, Le Sueur, Minn.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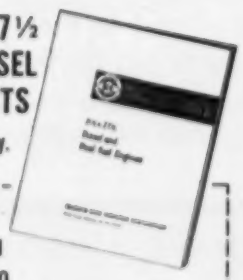

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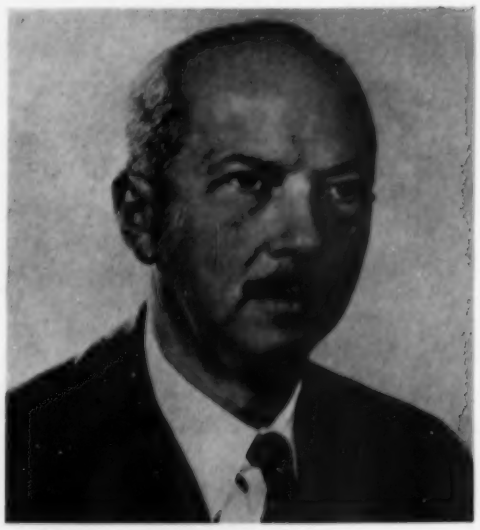
Elects President and Directors



McClure Kelley

Baldwin-Lima-Hamilton recently elected a new board of directors at the annual stockholders meeting. At the subsequent board of directors meeting, McClure Kelley was elected president. Mr. Kelley had previously been executive vice president of the corporation since December 1954 and was formerly president of Austin-Western Company. He succeeded Marvin W. Smith in the B-L-H presidency who, as chairman of the executive committee, will continue as executive officer with special duties and responsibilities.

Robert G. Tabors and Albert Clements were elected vice presidents of the Hamilton (Ohio) division. Mr. Tabors was formerly assistant general manager of the Hamilton Division and Mr. Clements was vice president and general manager of the Hamilton Division of the Clearing Machine Corporation.

Elected to the board of directors were J. F. Connaughton, Irwin Loewy, James H. McGraw, Jr., William F. Rockwell, H. E. Coombe, Joseph N. Ewing, Edward Hopkinson, Jr., McClure Kelley, Wm. Clarke Mason, Frederic A. Potts, William Wood Prince, George A. Rentschler, Walter A. Rentschler, John J. Rowe, Marvin W. Smith, Ralph K. Stiles and O. DeG. Vanderbilt, III.

Adds Six Gas Engines

Six Worthington gas engines have been added to Continental Oil Company's 280-well Sussex oil field in Wyoming. The engines, which help supply power for Continental's 15,500-barrel-a-day oil field, are also providing electric power for the nearby town of Linch. Engines provide continuous power for pumping oil 24 hours a day.

Merchandising Appointments

Howard J. Hopkins

John W. Puth

Purolator Products, Inc., one of the pioneer manufacturers of automotive oil filters and filtration equipment, announce two merchandising appointments. Howard J. Hopkins has been appointed merchandising manager and will supervise all of Purolator's advertising, public relations and sales promotion work. John W. Puth will act as assistant merchandising manager and will be responsible to Mr. Hopkins.

For Dependable Lubrication in Tough Service
MANZEL
FORCE FEED LUBRICATORS
Engineered to the Specific Needs of Your Particular Diesels
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DIVISION OF HOUDAILLE-HERSHEY CORP.
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900 HP ALCO DIESELS
Mod. 6-12½x13, 700 RPM Super-Charged, Hydr. Coupling #3497-9, 3500.
Very Low Price.
Excellent Condition—War Surplus.
S. M. DAVIS, 510 LaSalle, St. Louis 4, Mo.

FOR SALE
FOUR SKINNER MARINE UNAFLOW STEAM ENGINES.
Three cylinder vertical, Size 16 x 16, Type DM-3. Rated H.P. 300-600. R.P.M. 200-240.
Complete with Combustion Engineering Boilers Type SM. Condition, Very Good.
DIESEL ENGINEERING CO.
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Grinding and Hard-Chrome Plating of Diesel Engine Crankshafts

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Complete facilities for grinding, plating, Magnafluxing, and electrically-controlled heat-treating. Largest hard-chrome plating plant in the Mid-Continent area. Experience • Quality • Precision

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DALLAS, TEXAS

Mobile, Off-Shore Rig

Eight Allison TCHD-955 Torqmatic converters are pulling duty with four sets of GM twin 6-110 diesel engines in this off-shore oil drilling rig which is working in the Gulf of Mexico. They are used as the main power to drive the slush pumps. Another set of GM twin diesels with Allison converters provide power for the independent catworks, rotary drive and coring reel.

This mobile, off-shore rig can be floated from location to location. The overall length of the platform is 140 ft., and, with the pontoons in towing position, it is 102 ft. wide. The rig is completely self-contained and was designed to operate in 40 ft. of water and drill to 18,000-ft. depths.

Public Relations Supervisor

Nathaniel E. Jones has been appointed public relations supervisor for R. G. LeTourneau, Inc., Longview, Texas, according to Louis A. Flora, manager, advertising and public relations. Mr. Jones formerly was director of public relations for the Illinois State Chamber of Commerce.

This is a newly-created position. LeTourneau, since 1929 one of the leading builders of earth-moving equipment, sold that phase of its operation two years ago. The firm then moved to Longview where it has concentrated upon the development and manufacture of heavy-duty, electrically-powered equipment for logging, land-clearing, off-road transportation and general industry.

Accepts Syracuse University Post

Ralph M. Watson

Ralph M. Watson will leave Worthington Corporation to accept an appointment as associate dean of the L. C. Smith College of Engineering, and chairman of the Department of Mechanical Engineering, Syracuse University. Mr. Watson was formerly director of Research for Worthington Corporation. Prior to this period he served as design engineer on pumps and compressors for six years and as chief engineer in Worthington's Centrifugal Engineering Division for three years. He was later named assistant to vice president in charge of engineering and subsequently, assistant vice president-Engineering.

The holder of numerous patents on turbo machinery and related fields, Mr. Watson was also active in promoting Worthington's efforts in the nuclear power field and held major engineering responsibility in connection with Worthington's entry into the centrifugal compressor field.

Joins Cummins Field Staff

John W. Tucker

John W. Tucker has joined the field sales staff of Cummins Engine Company, Inc., Columbus, Indiana, as a regional representative, with headquarters in Los Angeles, California. His appointment was announced by L. E. Williams, Cummins' manager of Distribution. Mr. Tucker has been associated with the truck and industrial power industry in Southern California for 25 years. He worked for the Hall-Scott Motor Company from 1929 to 1952. In 1952 he joined the Cummins distributor for Southern California, Cummins Service & Sales, as manager of Industrial Sales. In his new position, Mr. Tucker succeeds J. P. Jung, who is now the Cummins regional manager for the southeastern region.

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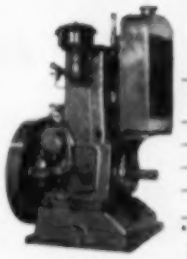

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*Lower rating due to power required to operate fan. Units can be equipped with stub shaft or clutch power take-off.

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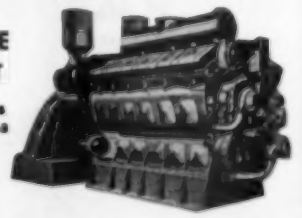

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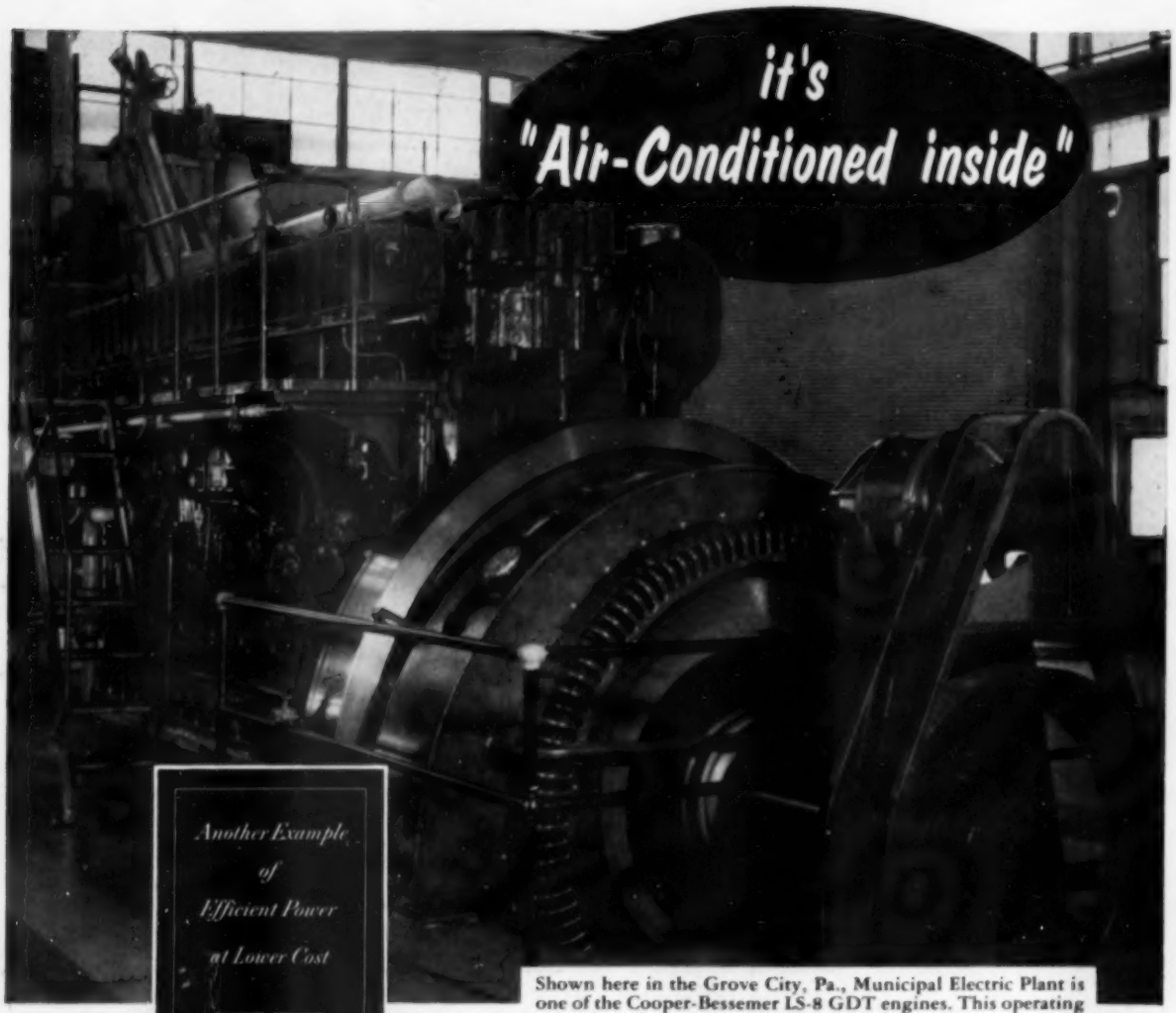
The LS-8 at Grove City Municipal...



Shown here in the Grove City, Pa., Municipal Electric Plant is one of the Cooper-Bessemer LS-8 GDT engines. This operating side view, shows the unit's air-conditioning inlet manifold.

NEW is a good word to describe the air-conditioned Cooper-Bessemer LS-8 in operation at the Grove City, Pa., Municipal Electric Plant. Rated 1500 KW capacity at 80% power factor, this engine is an outstanding improvement over previous LS-8's which were rated 1250 KW.

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